P006185A

Ericsson GSM System

RBS 2302

User’s Guide

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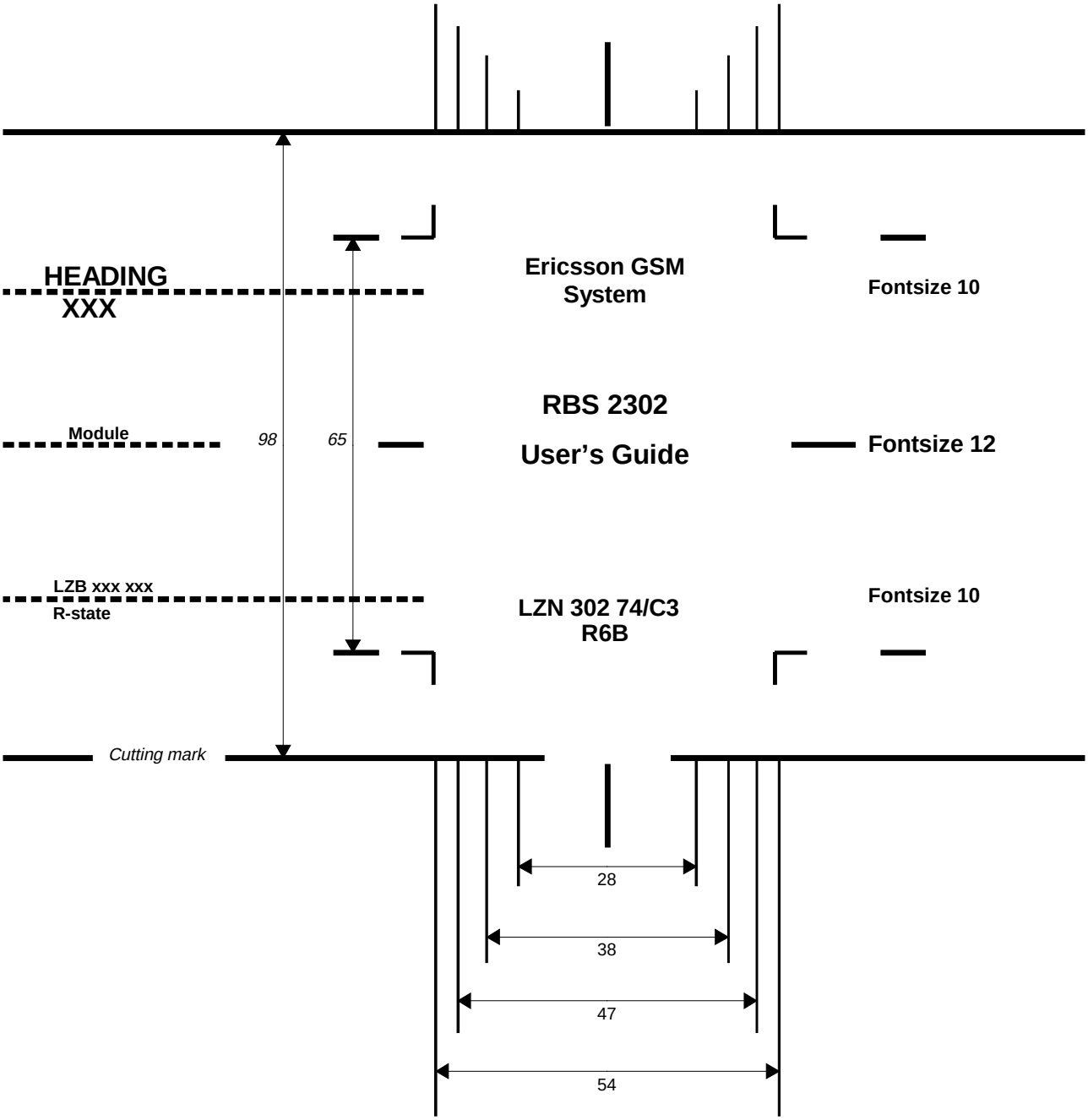
BINDER LABEL 1 (1)

Uppgjord (även faktaansvarig om annan) - *Prepared (also subject responsible if other)*		Nr - *No.*		
ERA/LRN/ZP Per Olof Höglund		1/001 59-LZN 302 74 Uen		
Dokansv/Godkänd - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
ERA/LRN/ZPC (Sture Blom)		2000-10-03	C	



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CAPTION LIST

Document No.
001 53-LZN 302 74 RBS 2302 User's Guide

Date	Rev
00-10-03	B

Introduction	1
Safety Instructions	2
Tools and Instruments	3
Site Planning and Requirements	4
Installation of RBS 2302	5
Installation of Power and Battery Cabinet	6
Antenna System Tests	7
Site Installation Tests	8
Optional Tests	9
RBS Site Integration	10
Fault Handling	11
Maintenance	12
Product Data	13
Glossary	14
Spare Parts Catalogue	15

User's Guide RBS 2302

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Due to continued progress in methodology, design and manufacturing, the contents of this document are subject to revision without notice.

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Contents

1 Introduction 17
1.1 Target Group 18
1.2 Radio Site Implementation Process 19
1.3 The Mobile Telephone System Overview 22
1.3.1 Switching System (SS) 22
1.3.2 Base Station System (BSS) 23
1.3.3 Operation and Support System (OSS) 24
1.4 Release History 24
1.4.1 R2A to R3A 24
1.4.2 R3A to R4A 25
1.4.3 R4A to R5A 27
1.4.4 R5A to R6A 29
1.4.5 R6A to R6B 30
2 Safety Instructions 33
2.1 Warnings 33
2.2 Notes 34
2.3 Electrical Hazards 35
2.3.1 Electrostatic Discharge, ESD 37
2.4 Working at Heights 38
2.4.1 Rules and Advice for the Safe Use of Ladders 38
2.5 Radio Frequency Radiation 40
2.6 Other Hazards 40
3 Tools and Instruments 43
3.1 Tools for Installation of RBS 2302 43
3.1.1 Installation Tools 43
3.1.2 Accessories 44
3.2 Tools for Installation of Power and Battery Cabinet 44
3.3 Instruments for Antenna System Tests 44
3.4 Instruments for Site Installation Tests 44
3.5 Tools for Maintenance 46

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3.6 Kit specification 47
4 Site Planning and Requirements 49
4.1 Competence requirement 49
4.2 Preconditions 49
4.2.1 Documents 49
4.2.2 Tools and Instruments 49
4.3 Ericsson Product and Document Numbering System 49
4.3.1 Site Identity 51
4.3.2 Site Documentation 51
4.4 Installation Planning Overview 51
4.4.1 Basic Information 52
4.4.2 Proposed Network Design 53
4.5 Site Investigation 53
4.5.1 Preparations 53
4.5.2 Site Visits 54
4.5.3 Site Investigation Report 54
4.5.4 Site Preparation 55
4.6 Installation Engineering 55
4.6.1 Cabinet Material Listing 55
4.6.2 Installation Material 56
4.6.3 Site Preparation 56
4.6.4 Site Installation Documentation 56
4.6.5 Site Design Documentation 57
4.7 Site Requirements 57
4.7.1 Permits 58
4.8 Earthing and Lightning Protection 59
4.9 RBS 2302 Overview 59
4.9.1 Base Station RBS 2302 59
4.9.2 Power and Battery Cabinet PBC 60
4.10 Configurations 61
5 Installation of RBS 2302 65

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5.1 Competence requirement 65
5.2 Preconditions 65
5.2.1 Preconditions for wall-mounted RBS 2302 66
5.2.2 Preconditions for pole-mounted RBS 2302 66
5.2.3 Documents 66
5.2.4 Tools and Instruments 66
5.3 Overview 67
5.4 Unpacking 67
5.5 Mounting the Mounting Plate 70
5.5.1 Mounting the Mounting Plate on a Wall 70
5.5.2 Mounting the Mounting Plate on a Pole 72
5.6 Mounting the Mounting Base 74
5.7 Mounting the Installation Box Door 75
5.8 Installation Box 77
5.9 Connecting Earth and Lightning Protection 79
5.10 Connecting External Cables 80
5.10.1 Opening the Interface Box 80
5.10.2 Connecting the AC Mains 81
5.10.3 Loosening the Interface Box Gland Plate 84
5.10.4 Assembling and Earthing of a twisted pair cable 84
5.10.5 Connecting the PCM cable 88
5.10.6 HDSL transmission module Installation (optional) 97
5.10.7 Connecting the External– and PBC Alarm Cables 102
5.10.8 Connecting the Extended OMT cable (optional) 102
5.10.9 Closing the Interface Box 103
5.11 Mounting the Power Supply Adapter (Optional) 104
5.12 Mounting the Cabinet 104
5.13 Connecting Internal Cables 107
5.14 Mounting the Sector Antenna (optional) 110
5.15 Mounting the Omnidirectional Antenna (optional) 111
5.16 Mounting the Multicasting Box (optional) 112

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5.17 Connecting the External Antenna Jumpers to the RBS (optional) 114
5.18 Mounting the Sunshields 116
5.18.1 Upper Sunshield 117
5.18.2 Left Sunshield 118
5.18.3 Lower Sunshield 118
5.18.4 Front Sunshield 119
5.19 4 and 6 TRX Configuration (optional) 119
5.20 Mounting the Fan Unit (optional) 121
5.21 Before leaving the site 129
5.22 Appendix, Lifting Device 129
5.22.1 General 130
5.22.2 Handling the Lifting Device 132
6 Installation of Power and Battery Cabinet 139
6.1 Competence requirement 139
6.2 Preconditions 139
6.2.1 Preconditions for wall-mounted PBC 140
6.2.2 Preconditions for pole-mounted PBC 140
6.2.3 Documents 140
6.2.4 Tools and Instruments 140
6.3 Overview 141
6.4 Unpacking 142
6.5 Mounting the Mounting Plate 143
6.5.1 Mounting the Mounting Plate on a Wall 144
6.5.2 Mounting the Mounting Plate on a Pole 145
6.6 Mounting the Mounting Base 148
6.7 Mounting the Installation Box Door 149
6.8 Installation Box 150
6.9 Connecting Earth and Lightning Protection 151
6.10 Connecting External Cables 151
6.10.1 Opening the Interface Box 152
6.10.2 Connection the AC Mains 154

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6.10.3 Loosening the Interface Box Gland Plate 156
6.10.4 Assembling the Cable Gland 157
6.10.5 Connecting the 24 V DC Power Supply Adapter 158
6.10.6 Connecting the Alarm cable 159
6.10.7 Closing the Interface Box 160
6.11 Mounting the Cabinet 160
6.12 Connecting Internal Cables 163
6.13 Installing the Batteries 164
6.14 Mounting the Sunshields 171
6.14.1 Upper Sunshield 171
6.14.2 Left Sunshield 172
6.14.3 Lower Sunshield 172
6.14.4 Front Sunshield 173
6.15 Before leaving the site 173
7 Antenna System Tests 175
7.1 About these tests 175
7.2 Preconditions 177
7.3 Checking the Installation 177
7.4 Calibrating the Antenna Tester 178
7.4.1 Select the Frequency Range 178
7.4.2 Perform a Calibration 178
7.5 Choosing SWR Test Setup 179
7.5.1 SWR Test Setup for RBS 2302 passive Antenna Systems 180
7.6 Performing SWR Test 181
7.7 Choosing DTF Test Setup 183
7.7.1 DTF Test Setup for RBS 2302 passive Antenna Systems 184
7.7.2 Entering Cable Parameters 184
7.8 Performing DTF Test 186
7.9 Calculating Feeder Attenuation 187
7.9.1 Examples of Feeder Attenuation calculations 188
7.10 Test Record 189

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7.10.1 Test Record Supplement....190
8 Site Installation Tests....191
8.1 Preface....191
8.1.1 About These Tests....191
8.1.2 Testing Procedure....191
8.2 Preconditions....191
8.2.1 Previous Records....191
8.2.2 Software requirements....191
8.2.3 Removal of Conducting Material....192
8.3 Radio Cabinet RBS 2302....192
8.3.1 Introduction....192
8.3.2 Location of the RBS User Interface....192
8.3.3 Optical Indicators....193
8.3.4 Switches and Connectors....196
8.3.5 Power Switches in the RBS....196
8.4 Power and Battery Cabinet(Optional)....197
8.4.1 Introduction....197
8.4.2 Location of the PBC Control Panel....197
8.4.3 Control panel....198
8.4.4 Power Switches in the PBC....200
8.5 Start-up and Shut-down....201
8.5.1 Start-up and shut-down of the RBS....201
8.5.2 Start-up and shut-down of the RBS and PBC....202
8.6 Alarms and Commands....203
8.6.1 Introduction....203
8.6.2 Power and Battery Cabinet (PBC)....203
8.7 Connecting the OMT....205
8.8 Test Sequence....206
8.8.1 Preparations....206
8.8.2 Flowchart....207
8.9 AC Mains Power Test....208

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8.10 Fan Unit Test 209
8.11 Check IDB 210
8.11.1 OMT related actions. Overview 211
8.11.2 Read IDB 211
8.11.3 Create IDB 211
8.11.4 Define External Alarms for R6 213
8.11.5 Define External Alarms for R7 213
8.11.6 Define External Alarm: Fan Unit for R6 and R7 214
8.11.7 Define External Alarm: HDSL for R6 and R7 215
8.12 Define Tei 215
8.13 Define PCM Parameters (E1, 120 ohm) 216
8.14 Define PCM Parameters (T1, 100 ohm) 216
8.14.1 Defining Short Haul parameters 217
8.14.2 Defining Long Haul parameters 219
8.15 HDSL Configuration 225
8.15.1 Link configuration 225
8.15.2 LED Indicators 226
8.15.3 Strapping 227
8.15.4 Test of HDSL 229
8.15.5 Start-up 229
8.16 Install IDB 229
8.17 Fault Status Reading 230
8.18 External Alarm Tests 231
8.18.1 External Alarm Test, 2 TRX Configuration 232
8.18.2 External alarm test on RBS 1, 4 TRX and 6 TRX Configurations 232
8.18.3 External alarm test on RBS 2, 4 TRX and 6 TRX Configurations 232
8.18.4 External alarm test on RBS 3, 4 TRX and 6 TRX Configurations 232
8.19 Battery Backup Test, RBS with Internal Battery 233
8.19.1 Test Procedure 233
8.20 Battery Backup Test, RBS with External Battery (PBC) 233
8.20.1 Switch Settings, Before and After Test 234

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8.20.2 Test Procedure, 2 TRX Sector Configuration 234
8.20.3 Test Procedure, 4 TRX and 6 TRX Configurations 234
8.21 Concluding Routines 236
8.22 Test Record 237
8.22.1 Site Data 238
8.22.2 Test Result 239
8.22.3 Trouble Report 240
8.22.4 Repair Delivery Note ''Blue Tag'' 240
9 Optional Tests 241
9.1 Preconditions 241
9.1.1 Previous Tests 241
9.1.2 Tester qualifications 241
9.1.3 Electrostatic Discharge 241
9.2 MS Call Test using BSC Simulator 242
9.2.1 Test Parameters 242
9.2.2 Cables 243
9.2.3 Test using the MS and BSC Simulator 243
9.2.4 Test through HDSL using the MS and BSC Simulator 246
9.2.5 Test Record 252
10 RBS Site Integration 253
10.1 Introduction 253
10.1.1 Overview 253
10.1.2 Range of Test 253
10.1.3 Flowchart 255
10.2 Preconditions 256
10.2.1 Preconditions for the BSC 256
10.2.2 Preconditions for the RBS 256
10.3 Transmission Test 256
10.3.1 Transmission Test E1 256
10.3.2 Transmission Test T1 257
10.3.3 Transmission Test E1 with HDSL 257

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10.4 Preparations....257
10.4.1 Check of Data....257
10.4.2 Check the BTS Software....259
10.4.3 Check the Abis Paths....260
10.4.4 Check the Digital Path....260
10.5 Connecting the RBS from the BSC....260
10.5.1 Bring MO's into Service and Deblock....260
10.5.2 Activation of BTS PCM Supervision (Optional)....264
10.5.3 Verification of Downloaded RBS Software....265
10.5.4 Activation and Check of Cell....265
10.5.5 Agree upon Parameters....266
10.6 Call Tests on Air Interface....266
10.6.1 Call Tests using TEMS....266
10.6.2 Diversity Call Test....267
10.6.3 Call Test to MS from fixed Network....273
10.7 Test of External Alarms....273
10.8 Leaving Site Routines....274
10.9 Handover Test....275
10.10 Helpful Hints....276
10.10.1 Setting the RBS in remote mode....277
10.10.2 Reference DT-files....277
10.10.3 Example of Exchange data for a 2-TRX cabinets....278
10.10.4 Example of Exchange data for a 6-TRX cabinet....281
10.10.5 LAPD Concentration Data....283
10.10.6 BTS PCM Supervision....283
10.10.7 Digital Path Data....283
10.10.8 Installation of BTS Software in IOG....283
10.10.9 Managed Object Hierarchy....285
10.10.10 Managed Object States....286
10.11 Test Records....287
10.11.1 Network Element Integration Test....287

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10.11.2 Network Element Acceptance Certificate 288
11 Fault Handling 289
11.1 Fault Tracing Hints 289
11.2 Fault Code List 290
11.2.1 Terminology 290
11.2.2 Decoding of Fault Maps 291
11.2.3 SO Fault Lists 293
11.2.4 AO Fault Lists 300
11.3 Trouble Report 305
12 Maintenance 309
12.1 Maintenance Process Overview 309
12.1.1 How to use this chapter 309
12.1.2 General 310
12.1.3 Fault Handling Workflow 310
12.1.4 Fault Analysis from OMC 311
12.1.5 RBS 2302 Maintenance Process 313
12.1.6 Fault Cases and External Alarms 314
12.2 Maintenance General for RBS 2302 315
12.2.1 Introduction 315
12.2.2 Location of the RBS User Interface 315
12.2.3 Optical Indicators 316
12.2.4 Switches and Connectors 318
12.2.5 Changing the RBS Local/Remote Mode 319
12.2.6 Shut down Sequence 320
12.2.7 Start up Sequence 323
12.2.8 Tightening Torques for RBS 2302 325
12.2.9 Cable connections overview for RBS 2302 325
12.3 Maintenance General for the PBC 326
12.3.1 Introduction 326
12.3.2 Location of the PBC User Interface 326
12.3.3 Control Panel 327

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12.3.4 Supervision of the PBC 329
12.3.5 PBC originated Alarms to the RBS 329
12.3.6 Stand Alone Mode 330
12.3.7 Fault Codes 330
12.3.8 Commands 331
12.3.9 Shut down Sequence 331
12.3.10 Start up Sequence 334
12.3.11 Tightening Torques for the PBC 336
12.3.12 Cable connections overview for the PBC 337
12.4 Fault Localization 337
12.4.1 Fault Tracing Guidelines for RBS 2302 338
12.4.2 Fault Tracing Guidelines for the PBC 343
12.5 Corrective Action for the RBS 349
12.5.1 HDSL Modem 349
12.5.2 Fan Unit (Optional) 352
12.5.3 Sunshields 357
12.5.4 Sector Antenna 367
12.5.5 Omnidirectional Antenna 369
12.5.6 External Antenna 370
12.5.7 Multicasting Box 371
12.5.8 Battery 373
12.5.9 Cables 374
12.5.10 Radio Cabinet 377
12.5.11 PSA 383
12.5.12 Fuses 385
12.5.13 Connection Board 387
12.5.14 Transmission Board 393
12.5.15 AC Board 397
12.5.16 Mounting Base 402
12.5.17 Internal Synchronization (Calibrate Oscillator) 407
12.6 Corrective Action for the PBC 409

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12.6.1 Sunshields 409
12.6.2 Batteries 416
12.6.3 Cables 425
12.6.4 Battery Cabinet 427
12.6.5 Fuses 435
12.6.6 EMC Board 437
12.6.7 DC Surge Board 440
12.6.8 AC Board 443
12.7 Preventive Maintenance for the RBS 446
12.7.1 Sunshields 447
12.7.2 Internal Battery 447
12.7.3 Cooling flanges 447
12.7.4 Connection Board 448
12.7.5 Transmission Board 448
12.7.6 AC Board 448
12.7.7 Internal Synchronization (optional) 448
12.7.8 Fan Unit (optional) 450
12.8 Preventive Maintenance for the PBC 450
12.8.1 Sunshields 451
12.8.2 Cooling flanges 451
12.8.3 Batteries 451
12.8.4 EMC Board 452
12.8.5 DC Surge Board 452
12.8.6 AC Board 452
12.9 Concluding Routines 452
12.9.1 Transport of a Faulty Unit 453
12.9.2 Report of Finished Work 453
12.9.3 Repair Delivery Note - "Blue Tag" 453
13 Product Data 455
13.1 Radio Base Station RBS 2302 455
13.1.1 Wall Mounting 456

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13.1.2 Pole Mounting....457
13.1.3 Optional Fan Unit....457
13.1.4 Optional HDSL transmission module....458
13.1.5 Lifting Kit (optional)....458
13.1.6 Dimensions and Weight....459
13.1.7 Space Requirements....459
13.1.8 Climatic Endurance....461
13.1.9 Vibrations....461
13.1.10 Acoustic Noise....461
13.1.11 Power Supply....461
13.1.12 Battery Backup....462
13.1.13 Earthing....463
13.1.14 Transmission....463
13.1.15 External Alarms....464
13.1.16 Antenna Connections....465
13.2 Power and Battery Cabinet (optional)....466
13.2.1 Wall Mounting....467
13.2.2 Pole Mounting....468
13.2.3 Dimensions and Weight....469
13.2.4 Space Requirements....469
13.2.5 Climatic Endurance....470
13.2.6 Vibrations....471
13.2.7 Acoustical Noise....471
13.2.8 Power supply....471
13.2.9 PBC Backup Capacity....472
13.2.10 Earthing....473
13.3 HDSL Modem....473
13.3.1 General....473
13.3.2 HDSL Modem Technical Specification....473
13.3.3 Material....475
14 Glossary....477

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1 Introduction

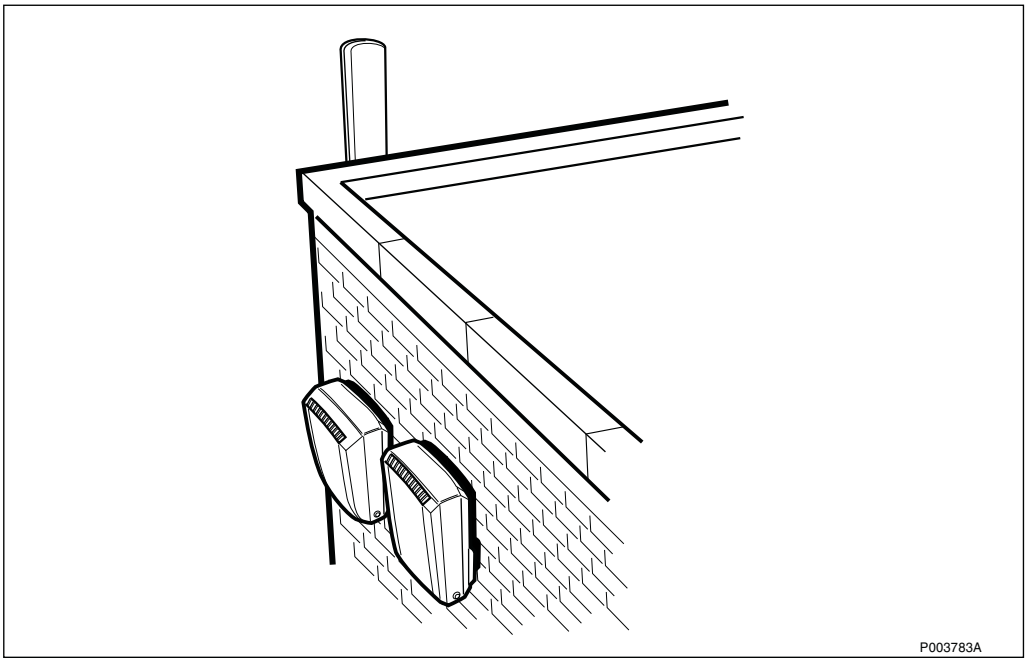

Figure 1 RBS 2302 and PBC, wallmounted

- The RBS 2302 is a high quality micro base station which enables a simpler site search process, whilst at the same time, allowing for cost-efficient implementations of high capacity radio networks. This makes the RBS 2302 very landlord friendly and easy to place wherever you need it.
- The RBS 2302 can be mounted on a pole, like a lamp post or in an antenna tower, or directly on the wall. In itself, the RBS 2302 is a complete BTS site, including transmission, integrated power supply, optionally integrated antennas and a optional battery-backed power supply.

The RBS 2302 User's Guide consists of the chapters listed below. A brief summary of the chapters is presented.

Introduction

This chapter.

Safety

Contains information that shows the system used for presenting safety instructions.

Tools and Instruments

Contains lists of all recommended tools and instruments.

Site Planning and Requirements

Describes the installation engineering process for the RBS 2302.

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Installation of RBS 2302

Describes activities for the installation of the mounting base, connection of cables, external antenna and mounting the radio cabinet on the mounting base.

Installation of Power and Battery Cabinet

Describes activities for the installation of the mounting base, connection of cables and mounting the battery cabinet on the mounting base.

Antenna System Tests

Describes the site specific tests for antennas that can be performed at site.

Site Installation Tests

Describes the site specific tests that can be performed at site.

Optional Tests

Describes the optional site specific tests that can be performed at site.

RBS Site Integration

Describes how to integrate a RBS site into a network.

Fault Handling

Contains helpful information when an error on site has occured, for instance the total fault code list, fault tracing hints and information regarding trouble reports.

Maintenance

Describes first line Maintenance which means that swap repair is made at the site and that only replaceable units are handled.

Product Data

Technical data for all parts that can be located on site.

Glossary

Contains abbreviations and acronyms used in the text.

Spare Parts Catalogue

Contains relevant information for ordering first line spare parts.

1.1 Target Group

The target group for this binder is all personnel involved in the RBS 2302 activities.

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The aim of the RBS 2302 User's Guide is to present the information in a userfriendly way.

If you have any comments or questions regarding the usability or the contents, please contact your local Ericsson company.

Help Desk

E-mail address to Product Line Maintenance Base Transceiver Stations helpdesk (for Ericsson internal use only):

plmbts@era.ericsson.se

See also *http://gsmrbs.ericsson.se/technical_support/* for more information.

1.2 Radio Site Implementation Process

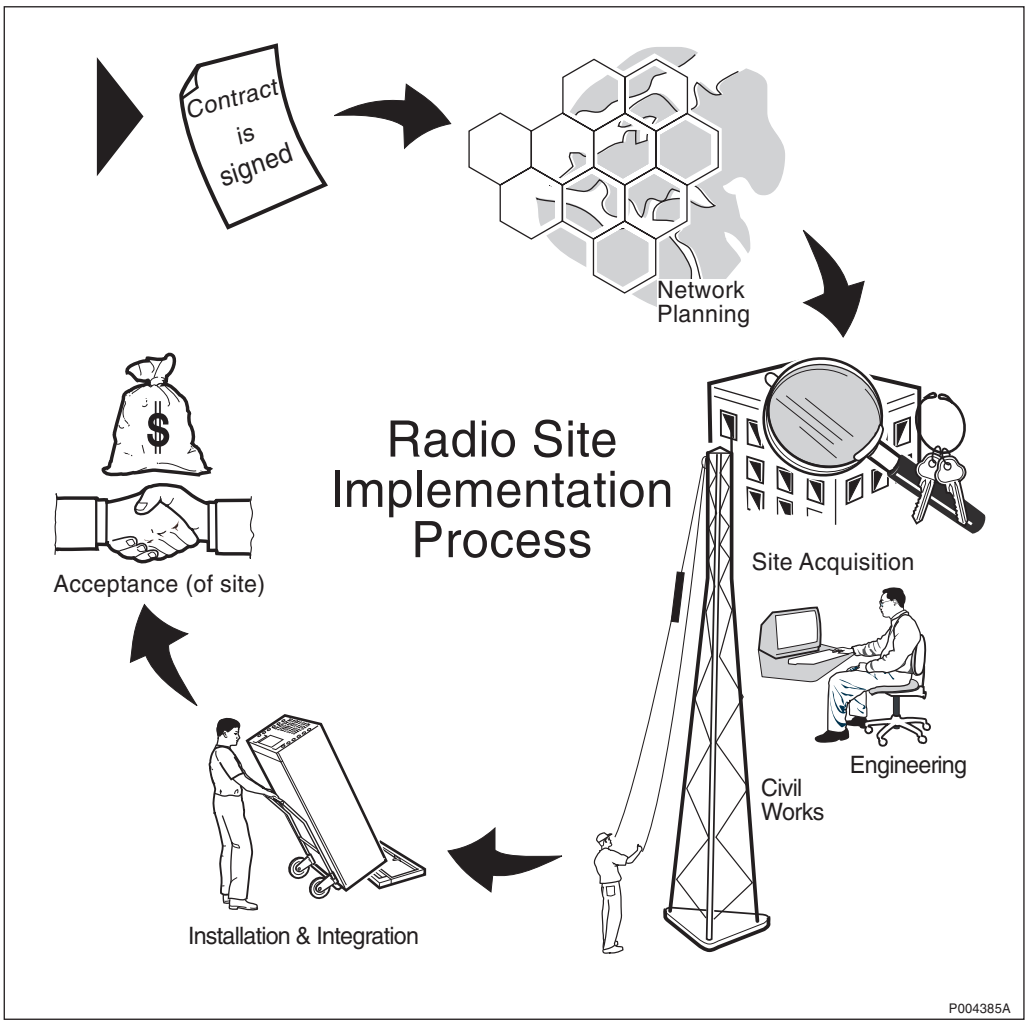

Figure 2 The Radio Site Implementation Process

The Installation and Integration process is part of the overall Radio Site Implementation process which covers the work from the beginning stages of getting an order and planning and designing the entire network down to installing the RBS sites and integrating them into the network.

For further information about the specific planning process, *see chapter Site Planning and Requirements.*

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Network Planning Process

The Network Planning process consists of the following activities:

- Dimensioning of network.
- Dimensioning of equipment for radio, transmission, switching, operation and maintenance.
- Defining and ordering market adaptation products, for example programs for national signalling towards the public telephone network.
- Measuring of radio frequency and interference.
- Producing digital maps and data.

Site Acquisition

The Site Acquisition process is performed in close co-operation with the Civil Works process and to some extent with the Engineering process.

The Site Acquisition process consists of the following activities:

- Searching for sites and gaining a site appraisal.
- Outlining the site design and evaluating the cost.
- Negotiating and signing leasing contracts.
- Handling permits and arranging a hand-over to the Engineering personnel.

Civil Works

The Civil Works process is performed in close co-operation with the Site Acquisition process and to some extent with the Engineering process

The Civil Works process consists of the following activities:

- Preparing a detailed civil works design of the site.
- Updating the costs for the site construction.
- Arranging the site construction.
- Performing a site inspection and handing over an as-built document to the Engineering personnel.

Engineering

The Engineering process begins when the Site Acquisition process and Civil Works process are complete. The Engineering process consists of the following activities:

- Measuring and collecting information about the sites.
- Designing the antenna and radio configuration and producing cable drawings.
- Making drawings showing the position of antenna and RBS equipment.

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- Defining areas of responsibility between the buyer and teh contractor.
- Producing site specific information in the *Radio Site Installation Documentation.*

Installation and Integration

The work involved in this process is performed by Installation personnel and Test and Integration personnel.

Installation personnel are responsible for the following activities:

- Installing the RBS on the ground, on a wall.
- Earthing the RBS.
- Connecting a power supply to the RBS.
- Connecting the antenna system to the RBS.
- Installing cable ladders and cable ducts.
- Installing battery back-up.
- Installing PCM cables.

The Test and Integration personnel are responsible for the following activities:

- Performing the tests specified in the contract and integrating the site.
- Troubleshooting if tests indicate a fault.
- Documenting the test results in the *Radio Site Installation Documentation* which is returned to the Engineering personnel.

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1.3 The Mobile Telephone System Overview

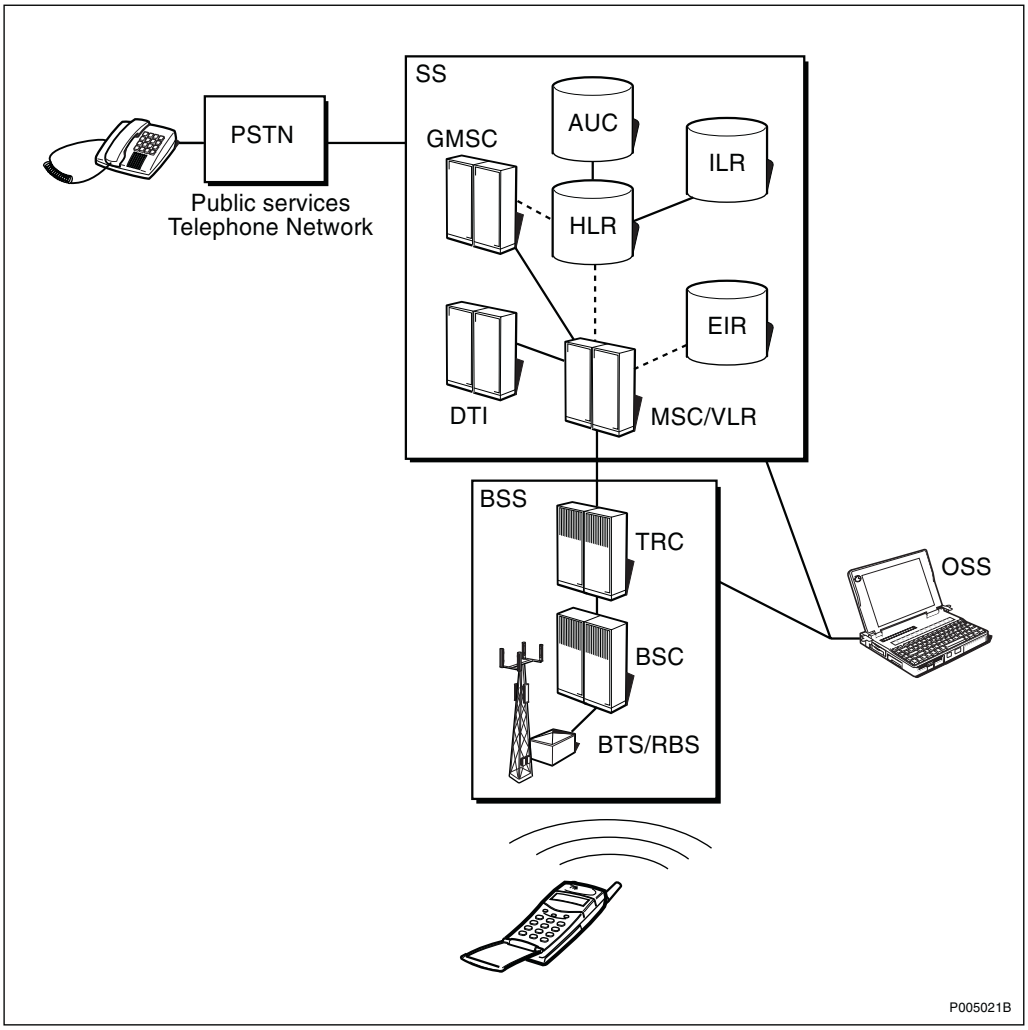

Figure 3 GSM System Overview

Ericsson's GSM System is a mobile telephone system containing the frequency bands GSM 900, GSM 1800 and GSM 1900.

The GSM network is divided up into three major systems:

- Switching System (SS)
- Base Station System (BSS)
- Operation and Support System (OSS)

1.3.1 Switching System (SS)

The *Switching System* consists of the following elements:

Mobile Services Switching Centre (MSC)

The MSC performs the telephony switching functions of the system. It controls calls to and from other telephone and data systems and other functions such as network interfacing, common channel signalling.

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Gateway MSC

A Gateway is a node to interconnect two networks. The gateway is often implemented in an MSC.

Home Location Register (HLR)

The HLR is a database used for storage and management of subscriptions including a subscriber's service profile, location information and activity status.

Visitors Location Register (VLR)

The VLR is a database containing temporary subscribers information needed by the MSC to service visiting subscribers. The VLR is always integrated with the MSC. When a new mobile station roams into a new MSC area the VLR connected tot he MSC will request data about the mobile station from the HLR.

Authentication Centre (AUC)

The AUC provides authentication and encryption parameters that verify the user's identity and ensure the confidentiality of each call.

Equipment Identity Register (EIR)

The EIR is a database containing information about the mobile equipment identities that prevent calls from stolen, unauthorized or defective mobile stations.

Data Transmission Interworking Unit (DTI)

The DTI consists of both hardware and software and provides an interface to various networks for data communication. Through the DTI users can alternate between speech and data during the same call.

Interworking Location Register (ILR)

ILR makes inter—system roaming possible between the AMPS network and the GSM 1900 network . ILR consisit of an AMPS HLR and partsof a GSM 1900 VLR.

1.3.2 Base Station System (BSS)

The *Base Station System* consists of the following elements:

Transcoder Controller (TRC)

The TRC provides teh BSS with rate adaptation capabilities. A device which performs rate adaptation is called a transcoder. The bitrate per channel is decreased from 64 kbit/s to 16kbit/s. This saves transmission links between the MSC to the BSCs.

Base Station Controller (BSC)

The BSC provides all the control functions and physical links between the MSC and the BTS. It is a high capacity switch that handles

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functions such as: handover, cell configuration data, and control of radio frequency power levels in base transceiver stations. A number of BSCs are served by an MSC.

Base Transceiver Station (BTS)

The BTS handles the radio interface to the mobile station. The BTS is the radio equipment (transceivers and antennas) needed to serve each cell in the network. A group of BTSs are controlled by a BSC.

The Radio Base Station (RBS) includes all the radio and transmission interface equipment needed on one site.

1.3.3 Operation and Support System (OSS)

The *Operation and Support System (OSS)* is the functional entity from which the network operator monitos and controls the system. It is a two-level management function with a Network management Centre (NMC) and subordinate Operation and Maintenance Centres (OMC). NMC staff concentrate on system-wide issues whereas local personnel at each OMC concentrate on short-term regional issues.

The OSS is designed to provide a Management system which supports a number of other network elements, the MSC, BSC, BTS, VLR, HLR, EIR, AUC and Mobile Intelligent Network Nodes (IN).

1.4 Release History

Except editorial changes such as correction of spelling, grammar and layout, this manual has been revised as follows:

1.4.1 R2A to R3A

The following information of major importance has been added to the binder sections listed below:

Site Planning and Product Data

- Block Diagram of PBC updated.
- *Chapter Transmission* updated.

Installation of Power and Battery Cabinet

- Dimension sketch included, showing the mounting plate and position of the mounted equipment.

Installation of RBS 2302

- Optional HDSL modem.
- 4 TRX and 6 TRX configurations.
- Optional Fan Unit.
- Dimension sketch included, showing the mounting plate and position of the mounted equipment.

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Site Installation Tests

- New *chapter Handover Test*.
- 4 TRX and 6 TRX configurations.
- Optional HDSL modem.

Maintenance Manual

- New *chapter HDSL Modem*.
- New *chapter Fan Unit*.

General Information

- *Fault Code List* updated.

Spare Parts Catalogue

- Optional Fan Unit.
- Optional HDSL modem.

1.4.2 R3A to R4A

In this release of RBS 2302 User's Guide the binder has been given consecutive page numbers. Also a major structural change has been done.

These changes, and other information of major importance that has been added, are listed below:

Introduction

- *Section Mobile Telephony Overview* has been updated and moved here from *chapter Site Planning and Product Data* (new name for this chapter in R4A, see below).
- *Section Radio Site Implementation Process* has been added.

Tools and Instruments

The *chapter Tools and Instruments* has been updated.

Site Planning and Requirements

The chapter formerly called *Site Planning and Product Data*has been divided into two separate chapters; *Site Planning and Requirements* and *Product Data*.

- *Site Planning and Requirements* now only contains information about site specific requirements.

Installation of RBS 2302

- Parts of the *subsection HDSL Transmission Module Installation* have been moved here from the chapter formerly called *General Information*.

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Antenna System Tests

This chapter has been extracted from *chapter Site Installation Tests*.

- *Subsection Anritsu SiteMaster* has been updated.

Site Installation Tests

- In *section RBS 2302* the *subsections Optical Indicators* and *Switches and Connectors* have been updated. Also the *subsection Power Switches in the RBS* has been moved here from *section Test Sequence*.
- In *section Power and Battery Cabinet* the *subsection Power Switches in the PBC* has been moved here from *section Test Sequence*.
- *Section Antenna Installation Tests* has been moved to a separate chapter; *Antenna System Tests*.
- In *section Test Sequence* there have been structural changes.
- In *section Test Sequence* the *subsection Flowchart* has been updated.
- In *section Test Sequence* two new subsections have been included; *AC Mains Power Test* and *Fan Unit Test*.
- In *section Test Sequence* the *subsection MS Test Call Using BSC Simulator* has been moved to the new *chapter Optional Tests*.
- The *section Fault Tracing Hints* has been moved to the new *chapter Fault Handling*.

Optional Tests

This chapter has been added in R4A.

- The *subsection MS Test Call Using BSC Simulator*has been moved here from *chapter Site Installation Tests*.

Fault Handling

This chapter has been added in R4A.

- The *section Fault Tracing Hints* has been moved here from *chapter Site Installation Tests*.
- The *sections Fault Code List* and *Trouble Report* have been moved here from the chapter formerly called *General Information*.

Maintenance

This chapter has been structurally redesigned.

Previous *section Maintenace General* has been divided into two separate sections; *Maintenace General for RBS 2302* and *Maintenace General for PBC*.

- In *section Maintenace General for RBS 2302*the *subsections Optical Indicators* and *Switches and Connectors* have been updated.

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Product Data

This chapter has been extracted from the chapter formerly called *Site Planning and Product Data*. It contains the technical data for the different units that can be mounted on site.

- *Section Lifting Device* and parts of *section HDSL Modem* have been moved here from the chapter formerly called *General Information*.

General information

This chapter no longer exists. The information in this chapter has been placed according to the description above.

1.4.3 R4A to R5A

Introduction

- Information about the new *chapter RBS Site Integration* added.
- Address to helpdesk updated.
- Release History updated.

Safety

The *chapter Safety* has been updated.

Tools and Instruments

The *chapter Tools and Instruments* has been updated.

Site Planning and Requirements

- The *section RBS 2302 Overview* has been moved here from *chapter Product Data*.

Installation of RBS 2302

- Information regarding the use of ESD wrist strap added.
- Instructions on how to use the drilling template added.
- Instructions on how to mount the HDSL door added. Also the information on how to connect the HDSL modem to the PCM connectors has been moved here from *chapter Product Data*.
- Instructions on how to install the fuses with the fuseholder added.
- Instructions on how to mount the Power Supply Adapter (PSA) added.
- Information on how to connect cabinets when cascade connection is used added.
- *Section Mounting the Multicasting Box (optional)*has been clarified.
- *Section Connecting the External Antenna Jumpers (optional)* has been updated.

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- *Section Mounting the Sunshields, subsection Upper Sunshield* has been given new information.
- *Section 4 and 6 TRX Configuration (optional)* has been updated.
- New information on how to route the alarm cable in *section Mounting the Fan Unit* added.
- *Section Lifting Device* has been moved here, and placed as an appendix, from *chapter Product Data*.

Installation of Power and Battery Cabinet

- Information regarding the use of ESD wrist strap added.
- Instructions on how to use the drilling template added.
- Structural changes in section *Connecting External Cables*.

Antenna System Tests

- *Subsection Anritsu Site Master* has been updated (minor changes).

Site Installation Tests

- Information regarding the use of ESD wrist strap added.
- In *section Test Sequence* there have been structural changes.
- In *section Test Sequence* the *subsection Flowchart* has been updated.
- In *section Test Sequence* the subsection formerly called *Multidrop* has changed name to *Network Configuration*. Also the information has been updated.
- In *section Test Sequence* the subsection formerly called *LBO Parameter Settings (T1)* has been divided into to subsections: *Define PCM Parameters (E1 120 Ω)* and *Define PCM Parameters (T1 100 Ω)*. Also the information has been updated.
- In *section Test Sequence* the *subsection Network Integration Test* has been updated and moved to the new *chapter RBS Site Integration*.
- In *section Test Sequence* the *subsection Handover Test* has been updated and moved to the new *chapter RBS Site Integration*.
- In *section Test Sequence* the *subsection HDSL Configuration* has been updated and moved here from *chapter Installation of RBS 2302*.

Optional Tests

- Information regarding the use of ESD wrist strap added.
- The *subsection Test through HDSL using the MS and BSC Simulator* has been added.

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RBS Site Integration

This chapter has been added in R5A.

Fault Handling

No changes.

Maintenance

- In *section Fault Localization*, information added to the subsections *Fault tracing Guidelines for RBS 2302*and *Fault tracing Guidelines for the PBC*.
- Information about the fuses for the Fan Unit added to *section Corrective Action for the RBS, subsection Fan Unit (optional)*.
- Information that the RBS do not have to be removed from service when changing the front, lower, left or upper sunshield added to *section Corrective Action for the RBS, subsection Sunshields*.
- Instructions on how to install the fuses with the fuseholder added to *section Corrective Action for the RBS, subsection Fuses*.
- New instructions regarding the fuseholder added to *section Corrective Action for the RBS, subsection Connection Board*.
- The Blue Tag, including the instructions, has been updated *in section Concluding Routines*.

Product Data

- The *section RBS 2302 Overview* has been moved to *chapter Site Planning and Requirements*.
- In *section Radio Base Station RBS 2302, subsection Power Supply* the values for Heat Generation have been changed.
- In *section Power and Battery Cabinet (optional), subsection Climatic Endurance* the temperature range for Normal Condition has been changed.
- *Section Lifting Device* has been moved to *chapter Installation of RBS 2302*.

1.4.4 R5A to R6A

Introduction

Release History updated.

Tools and Instruments

The *chapter Tools and Instruments* has been updated.

Installation of RBS 2302

- Information added that it may be necessary to protect the cabinet during installation due to bad weather conditions.

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- New section added, *Assembling and earthing of a twisted pair cable*.
- New section added, *Connecting the PCM cable*. This section contains new information how to connect the PCM cable with DC isolation.
- The product number for the 75 Ω coaxial cable with DC isolation has been changed to RPM 518 974/2.
- Information regarding the hysteresis of the temperature sensors for the fans added.

Installation of Power and Battery Cabinet

Information added that it may be necessary to protect the cabinet during installation due to bad weather conditions.

Site Installation Tests

- Information regarding SW requirements added in section *Preface*.
- The test section now contains only the tests. General information necessary to perform the tests has been moved to earlier sections. Example of this are sections *Start-up and Shut-down* and *Connecting the OMT*.
- Other minor structural changes have also been made.
- The flowchart in section *Test Sequence* has been updated.
- Information regarding the hysteresis of the temperature sensors for the fans added in section *Fan Unit Test*.
- In section *HDSL Configuration* the function of the leds has been updated.
- In section *Test Record* the test record for Stand Alone Tests has been updated.

Maintenance

In section *Preventive Maintenance for the RBS* the subsection *Internal Synchronization* has been updated.

1.4.5 R6A to R6B

General

Cable gland capacity has been changed throughout the document from 8–19 mm to 7–15 mm.

Product number of wrist strap has been removed throughout the manual.

“DC/Alarm” cable has been replaced by “DC/Data cable” throughout the manual.

Introduction

Release History updated.

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Tools and Instruments

The chapter *Tools and Instruments* has been updated.

Antenna System Tests

The entire chapter *Antenna System Tests* has been updated due to new version of Site Master.

Site Installation Tests

- New order for test sequence.
- New instruction for installation of IDB.

RBS Site Integration

In section *Helpful Hints*, a section added containing an example of exchange data for 6 TRX.

Product Data

- In section *Radio Base Station RBS 2302*, subsection *Power Supply*, the information regarding the power supply and heat generation has been updated.
- In section *Power and Battery Cabinet*, subsection *Power Supply*, the information regarding the power supply and heat generation has been updated.
- In section *Radio Base Station RBS 2302*, subsection *Vibrations*, information regarding base station vibration withstanding has been changed.

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2 Safety Instructions

This chapter shows the system used for presenting safety information.

Note: Reduce the risk of accidents by studying all the instructions carefully before starting work. If questions arise regarding the safety instructions, contact the supervisor or the local Ericsson company.

Where local regulations exist, these are to be followed. The safety information in this manual is a supplement to local regulations.

It is the responsibility of the local project manager to make certain that local regulations are known and followed.

The relevant manual (including this safety information) and specific instructions supplied by Ericsson must be followed in any work performed on the Ericsson products or systems. A sufficient knowledge of English or of any of the other languages in which the manuals or instructions are printed is necessary.

The safety information in the relevant manuals presupposes that any person performing work on Ericsson products or systems has the necessary education, training and competence required in order to perform that work correctly. For certain work, additional training or special training may be required. For more precise information on the amount and content of the general and/or special training required for work on Ericsson products or systems, please contact the supervisor or the local Ericsson company.

2.1 Warnings

Warnings are used to indicate hazardous activities. The warnings are preceded by the common hazard symbol.

Figure 4 Hazard symbol

The following three warning levels, shown here in order of urgency, are used:

DANGER

Danger means that an accident may occur if the safety precautions are neglected. This type of accident is likely to be fatal.

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WARNING

Warning means that an accident may occur if the safety precautions are neglected. This type of accident may be fatal or cause serious injury. It may also damage the product.

CAUTION

Caution means that an accident may occur if the safety precautions are neglected. This type of accident may cause injury or damage the product.

The following special symbols are used to indicate the risk of radio frequency radiation, electrical hazards and electrostatic discharge:

Figure 5 Radio frequency radiation

Figure 6 Electrical hazard

Figure 7 Electrostatic discharge

Warnings are used throughout this manual to alert the reader to special instructions concerning a particular task or operation that may be hazardous if performed incorrectly or carelessly. Therefore, read the instructions carefully.

Strict compliance with the special instructions while performing a task is the best way of preventing accidents.

2.2 Notes

Note: Notes are used to call the reader's attention to key points that might otherwise be overlooked.

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2.3 Electrical Hazards

High Voltage

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

- The AC installation must be carried out according to local regulations. These regulations may require the work to be carried out by a qualified and authorized electrician.
- Remove wrist watches, rings, bracelets, etc.
- Switch off the power if the cabinet is damp inside.
- Prevent damp entering the equipment during work in bad weather conditions.

DANGER

Improper electrical installation may cause fire or electrical shock. Approved circuit breakers for the AC mains and the cable's cross sectional areas must always be selected in accordance with local laws and regulations. Only a qualified and authorized electrician is permitted to install or modify the electrical installation.

Cable Markings

CAUTION

Verify that the cable markings correspond before connecting cables.

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Faulty Electric Tools

WARNING

Do not repair a faulty electric tool yourself. Hand it over to your supervisor in exchange for a functioning tool.

Drilling

WARNING

Do not drill holes in the Radio Base Station. The drill bit may come into contact with live wires.

- Always use insulated protective gloves, such as the LYB 1032, when drilling where live wires might be hidden.
- Always use eye protectors (goggles) when drilling. Flying chips and dust may get into your eyes.

Thunderstorms

DANGER

Avoid working on electrical installations or towers/masts during thunderstorms.

Thunderstorms create strong electric fields. For that reason, and to avoid direct strokes of lightning, it is essential that the equipment is properly earthed for thunderstorm conditions.

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2.3.1 Electrostatic Discharge, ESD

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

Electrical charges are generated by friction when a body moves, rubs against clothes, slides against a chair, when shoes rub against the floor, and when you handle ordinary plastics, etc. Such charges may remain for a considerable period of time.

Handling of printed board assemblies and IC components

Always use an approved antistatic bracelet to avoid damage to components mounted on printed board assemblies. The ESD wrist strap contains a resistor with an ohmic value greater than 1 MΩ in the cable to protect the operator. The resistance value is low enough to discharge the electrostatic voltage. Never replace the cable with any other cable. The ESD wrist strap must be connected to earth. Ericsson recommends wrist strap LYB 250 01/14.

Storing and Transporting printed board assemblies and IC Components

Use the original packaging. If this is not available, use a conductive material, or a special IC carrier that either short-circuits or insulates all leads of the components.

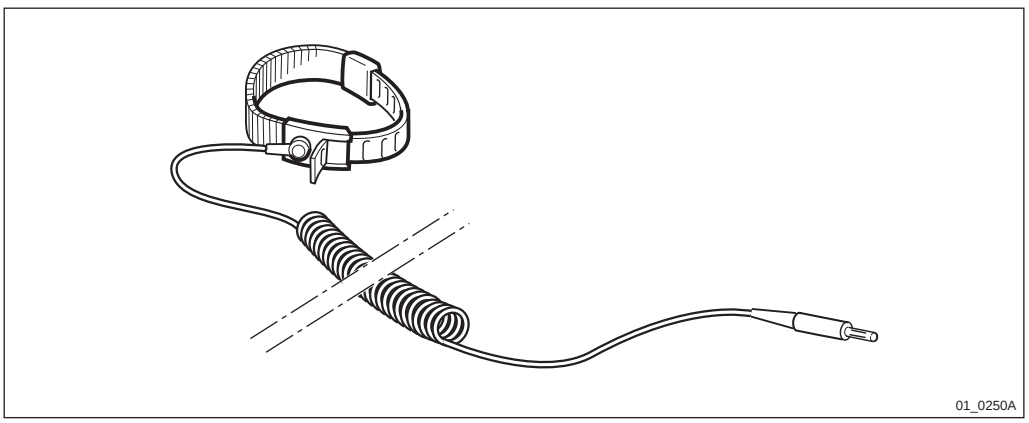

Figure 8 ESD wrist strap LYB 250 01/14

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DANGER

To avoid potentially fatal circuits through the body to earth, wrist strap connections must include a resistor of at least 1 MΩ. Test the wrist strap regularly.

2.4 Working at Heights

WARNING

Some working areas involve the risk of accidents caused by falling objects.

For example, when working on a mast, tower or a roof, the following precautions must be taken:

- Personnel working at heights must have the appropriate training and medical certificate.
- Full body safety harness and safety helmet must be used.
- Adequate protective clothing is essential in cold weather.
- All lifting devices must be tested and approved.
- During work on a mast, all personnel in the area must wear helmets.

2.4.1 Rules and Advice for the Safe Use of Ladders

- Make sure that the ladder is undamaged and has been approved for use.
- Do not overload the ladder.

The following types of ladders must be guyed or otherwise secured

- Leaning ladder longer than 5m.
- Free-standing ladder with a platform and knee-support, and with over 2 meters height to the platform.
- Any other free-standing ladder longer than 3m.

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Positioning the ladder

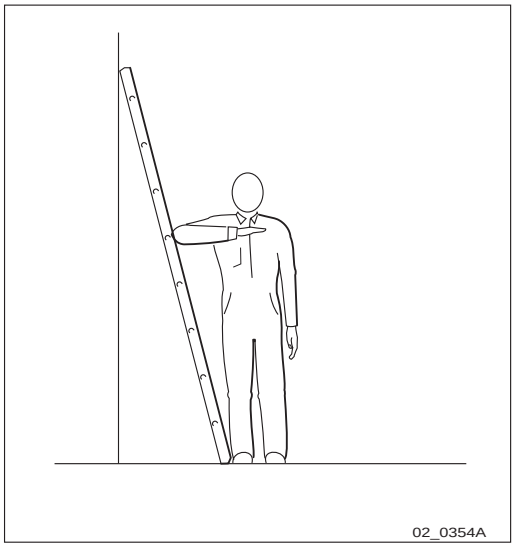

Figure 9 Checking the angle

- The ladder's inclination should be approximately 1:4 (75°). Position the ladder according to its gradation indicator (if there is one) or check the angle with your elbow.
- Use the ladder foot or a ladder support to reduce the risk of tipping over sideways.
- Always attach extension legs to a ladder that is to be used on a sloping base. Never prop up a ladder with boxes, stones or the like.
- Extend the ladder completely.
- Check that all four anti-slipping treads are firmly positioned on the base.

Climbing and using the ladder

Figure 10 Climbing the ladder

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- Climb the ladder facing it.
- When you lean sideways, outward from the ladder, your navel should never be outside the edge of the ladder's frame.
- Always keep 3 points of contact (two feet and one hand, two hands one foot) with the ladder when working on it. This will reduce the risk of falling.
- Never climb the topmost four rungs of a ladder. If you have to climb up on a roof, the ladder should extend at least one meter above the eaves.

2.5 Radio Frequency Radiation

CAUTION

Radio frequency (RF) radiation from antenna systems can endanger your health.

Co-ordinate with all mast users to switch off the transmitters when working with, or near, antennas.

2.6 Other Hazards

Fire

WARNING

Fire may spread to neighboring rooms. When working on a radio base station you may have to open cable ducts, channels and access holes, thereby interfering with the fire sectioning of the building.

- Close the cable ducts and fire doors (if applicable) as soon as possible.
- After completing work on cables, seal the cable ducts according to the regulations for the building.
- Minimize the amount of inflammable material.
- Avoid storing empty packaging material on the site.
- Use a powder or carbon dioxide type of fire extinguisher due to the electric nature of the equipment inside the Radio Base Station.

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Sharp Edges

WARNING

Wear protective gloves when handling the equipment. There may be sharp metal edges.

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3 Tools and Instruments

This section contains lists of all tools and instruments recommended for complete installation of the RBS 2302 and the Power and Battery Cabinet (PBC).

3.1 Tools for Installation of RBS 2302

The recommended tool set for Installation is Personal Installation Tool Set Product No: LTT 601 96/1. For more information regarding this tool set see:

General Installation Instructions *LZN 302 49*

3.1.1 Installation Tools

The following tools is required from the Personal Installation Tool Set LTT 601 96/1.

Description
Side cutting pliers
Snip nose pliers
Wire stripper 0,2-6 mm²
Screwdriver, TORX, T10, T20, T30
Screwdriver, wide 3 mm
Screwdriver, wide 5.5 mm
Adjustable spanner 10″
Penlight, Maglite mini
Knife
Measuring tape, 5m
Voltage tester
U-ring wrench 10 mm
U-ring wrench 17 mm
U-ring wrench 19 mm
U-ring wrench 20 mm
U-ring wrench 24 mm
Torque wrench 4-20 Nm
Torque wrench 10-55 Nm
Spirit level
Socket set 3/8 ″
ESD wrist strap

Description	**Product No:**
Cordless hammer drill machine tool set 230 V	LTT 601 12/2
Cordless hammer drill machine tool set 110 V	LTT 601 12/1

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Crimping Tool Set	LTT 601 86
U-ring wrench 15 mm	
U-ring wrench 18 mm	
U-ring wrench 22 mm	
Eye protectors	
Hearing protector	

For safety equipment, please refer to *chapter Safety*.

Installation Materials

Description	Product No.
Sealing Kit	5/NTM 201 230/3
Earthing Set	5/NTM 201 201

3.1.2 Accessories

Description	Product No.
Lifting Device Kit (Lifting Handle SXK 107 5775/1 included)	SXK 107 5723/1
Lifting Handle	SXK 107 5775/1

The Lifting device may be used for lifting the cabinet up to 5 m and for a weight up to 25 kg. The Power and Battery Cabinet can NOT be lifted equipped with batteries. The handle can be used to carry the cabinets.

3.2 Tools for Installation of Power and Battery Cabinet

Same tools as for *Section 3.1.1 on page 43*.

3.3 Instruments for Antenna System Tests

Table 1 SiteMaster covering GSM 900/1800/1900 one port Antenna test

Description	Specification	Product No.	Qty
Antenna tester	SiteMaster S331B (adapters included)	LPK 102 101/5	1

3.4 Instruments for Site Installation Tests

Different test methods needs various instruments and cabling kits.

For example:

1. The Network Integration Test is marked with number 3 in *Table 2 on page 45*.
2. According to *Table 3 on page 45* the test method number 3 requires index C.

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3. According to *Table 4 on page 46*, the index C equals a TEMS kit. This table also gives you information about the product number and required quantity.

   Information regarding the parts included in the various kits, *see Section 3.5 on page 46*.

Table 2 Explanations for the different test methods

Test Method No	Explanation
1	Transmission Test 1.5 MBit/s (T1) or 2.0 MBit/s (E1)
2	MS-Call test with BSCSim II
3	Network Integration Test
4	Call Test with BSC connection
5	OMT related tests
6	AC Mains Power Test
7	MS-Call test with BSCSim II through HDSL

Table 3 Test method versus required Instruments & accessories

Test Method	Instruments and Accessories							
Index	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
1						X		
2		X	X	X	X			
3		X						
4		X						
5	X							
6							X	
7		X	X	X	X			X

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Table 4 Explanations for Instruments & accessories

Index	Instrument/accessory	Product No.	Qty
A	OMT Kit (test set)	NTM 201 2159/1 (R6) or NTM 201 2289/1 (R7)	1
	Cable, 4-wire to RS 422 connector, 50 m (Extended OMT)	RPM 518 976/1	1
	Cable, RS 422 connector to RS 232 connector, 2 m (Extended OMT)	RPM 518 964/1	1
B	TEMS GSM Dualband	LPB 123 013/2	1
	TEMS GSM 1900	LPB 123 014/2	
C	BSCSim II	LPP 106 35/11	1
D	Filter Unit (Multi casting box), 2 units are required for 4 TRX, and 3 units is required for 6 TRX configuration.	KRF 201 439/1	1-3
E	Test Accessories (Call Test), 2 units are required for 4 TRX, and 3 units is required for 6 TRX configuration.	NTM 201 2216/3	1-3
F	Loop Forward/Backward board	LPY 107 757/1	1
G	Fluke 79 III Multimeter	LPK 102 024/2	1
H	MartisDXX HTU-2M	ZAT 759 20/101	1
	HDSL Cable Kit	KDY 196 48/1	1

Using the OMT SW and TEMS SW

A Lap Top PC is needed with following minimum requirements:

- Intel 486 processor
- 66 MHz
- 16 MB RAM
- MS Windows version 95/NT

3.5 Tools for Maintenance

General Maintenance Tools

Depending on the maintenace that is to be performed, use the appropriate tools and instruments from previous sections.

Special Maintenance Tools

The Loop Forward/backward board CB21, Product No: LPY 107 757/1, is for example used during change of RBS 2302 mounting base or transmission filter board.

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The cover plate Product No: SXA 117 1926/1 is used to seal the RBS mounting base installation box. It is used if the RBS cabinet is changed and it takes time until the new cabinet is mounted.

Item	Product no.
Loop forward/backward board, CB21	LPY 107 757/1
Cover plate for mounting base	SXA 117 1926/1

Instrument for Calibrate Oscillator Product No. LPK 102 102/1

Pos	Description	Qty
1	Suitcase	1
2	Instrument Set	1
3	Cable, 1/4 Euro connector jack to 2x BNC plug	1
4	Cable, BNC plug to SMB jack	1

3.6 Kit specification

Test Accessories Product No. NTM 201 2216/3 (Call Test)

List of including parts

Item	Qty
MS cable	3
Adapter	1
Attenuator 30 dB, 2 W	1

BSCSim II Kit Product No. LPP 106 35/nn

BSCSim II Kit		Product No.
BSCSim II Kit		LPP 106 35/10
Item	**Description**	**Qty**
1	PC Platform Fieldworks	1
2	BSCSim II Test Tools Software	1
3	BSCSim II User's guide	1
4	PCM Communication Kit	1
5	Cable Kit for Maxite and RBS 2000	1
6	Cable Kit for Maxite and RBS 2302	1

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7	Microsoft Mouse	1
8	Etherlink Card	1

BSCSim II Kit		**Product No.**
BSCSim II Kit		LPP 106 35/11
Item	**Description**	**Qty**
1	PC Platform Dolch	1
2	BSCSim II Test Tools Software	1
3	BSCSim II User's guide	1
4	PCM Communication Kit	1
5	Cable Kit for Maxite and RBS 2000	1
6	Cable Kit for Maxite and RBS 2302	1

OMT Kit Product No. NTM 201 2289/1 (R7 Software)

Item
OMT 32 Bit software
OMT Cable (RS 232)
OMT User's Manual

OMT Kit Product No. NTM 201 2159/1 (R6 Software)

Item
OMT 32 Bit software
OMT Cable (RS 232)
OMT User's Manual

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4 Site Planning and Requirements

This section describes the installation engineering process. Careful planning of preinstallation activities, such as antennas, cables, power etc. is essential for fast installation and commissioning of base stations. This section contains document rules that are applicable to Ericsson organizations only.

4.1 Competence requirement

In order to do site planning work according to this manual in a safe and professional way, the work shall be done by a skilled person.

The following qualifications are minimum requirements:

- Good understanding of radio and telephone engineering.
- Good understanding of engineering English.

4.2 Preconditions

The Preconditions section lists general documents needed for installation engineering.

4.2.1 Documents

Ordering Information for RBS 2000 Installation Material	*131 62-HRB 105 01/MA*
Rules and Methods for Installation Engineering	*EN/LZB 119 2935/6*
Standard Site Material Catalogue	*LZN 302 39*
General Installation Instructions	*LZN 302 49*

4.2.2 Tools and Instruments

See chapter Tools and Instruments.

4.3 Ericsson Product and Document Numbering System

Two concepts or words - product and document - are used at Ericsson.

Products are numbered with a product number ("ABC number") which in its basic form consists of a three to five letter combination followed by a digit group of up to seven numbers. This number is called the Product Number. The three-letter group divides products into classes according to use, construction or other essential attributes.

The one or two letters for notation of origin are used when the design responsibility does not rest with a Swedish Ericsson company. (Reference document 1120-101 in Standard binder ST1B).

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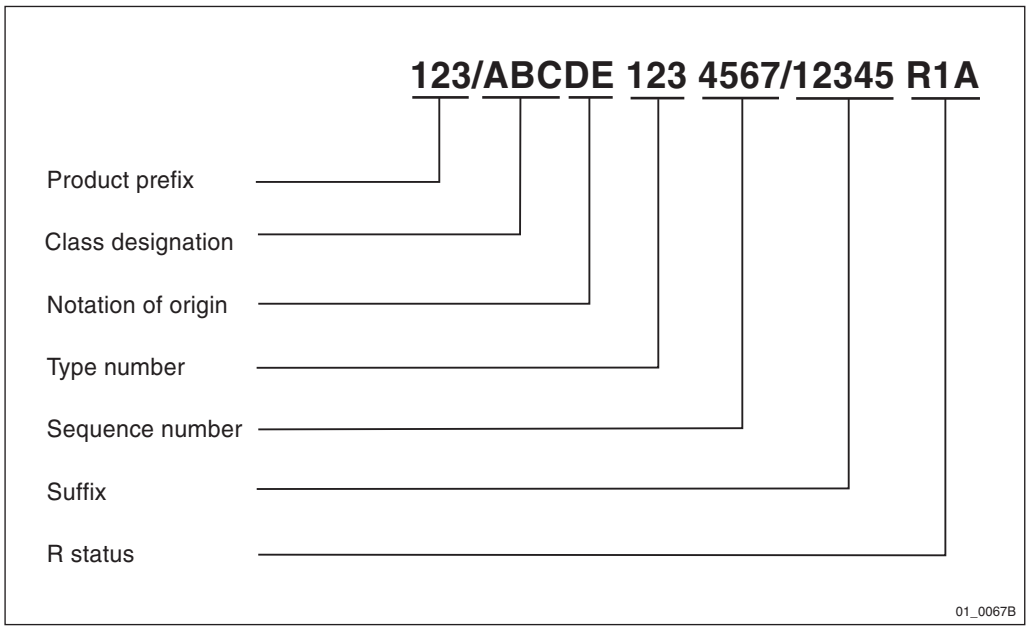

Figure 11 The complete product identity

Documents are numbered using the decimal classification system. A document number consists of a decimal class and the product number of the described product.

The decimal class consists of four or five digits that classify the information by activity and subject areas. A decimal class is defined in a decimal class information document that describes which kind of document the decimal class is used for, how the information is used and which document names are permitted. These documents are numbered 0011-XXXX Uen, (XXXX stands for the decimal class which is of interest).

Decimal class information documents are filed in the central archives of the company.

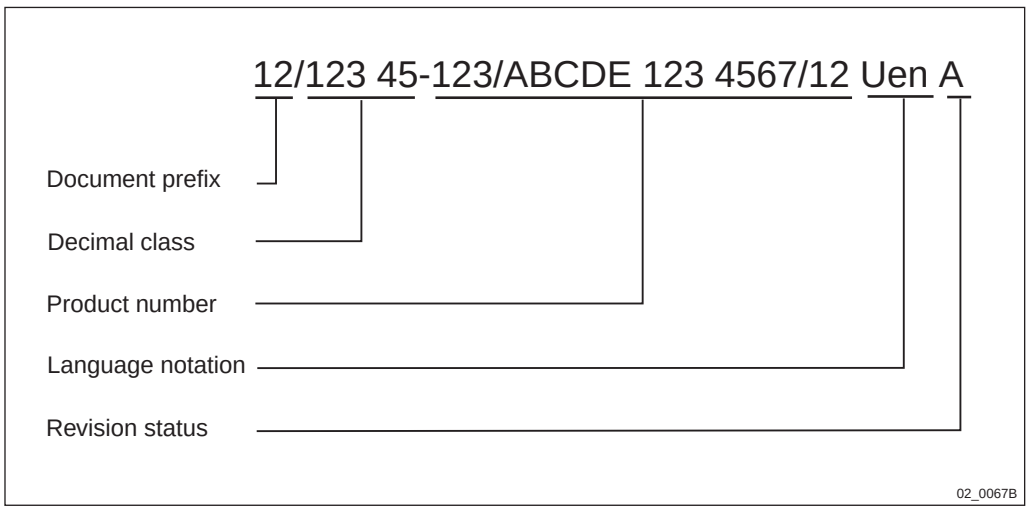

Figure 12 The complete document identity

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4.3.1 Site Identity

In installation engineering the whole site is considered to be a product. The site is given a product number from the ABC class IPA (Plants)

Example: IPA 110 1001

4.3.2 Site Documentation

The build-up of the site is recorded with a number of site documents. The following is a list of suitable decimal classes for the site documents.

Decimal class	Approved document name	Explanation
127 11-	Plant specification	
127 04-	Configurationdata	Site data
193 38-	Cell design data	Cell parameters
153 12-	Antenna placement information	Antenna and tower arrangement
153 38-	Situating plan	Site layout
193 05-	Floor plan drawing	
193 18-	Cable distribution diagram	
193 20-	Cabling information	Power supply
193 24-	Cable way drawing	
179 61-	Certificate of conformance	
152 83-	Test report	

A document showing the physical layout of the previous site, a situating plan, will be numbered as shown in the example below.

Example: 153 38-IPA 110 1001

A base station with integrated antennas will of course not need all the mentioned documentation, whereas a base station with a distributed antenna system might need a more detailed documentation.

4.4 Installation Planning Overview

The figure below is an overview of the Installation Planning process.

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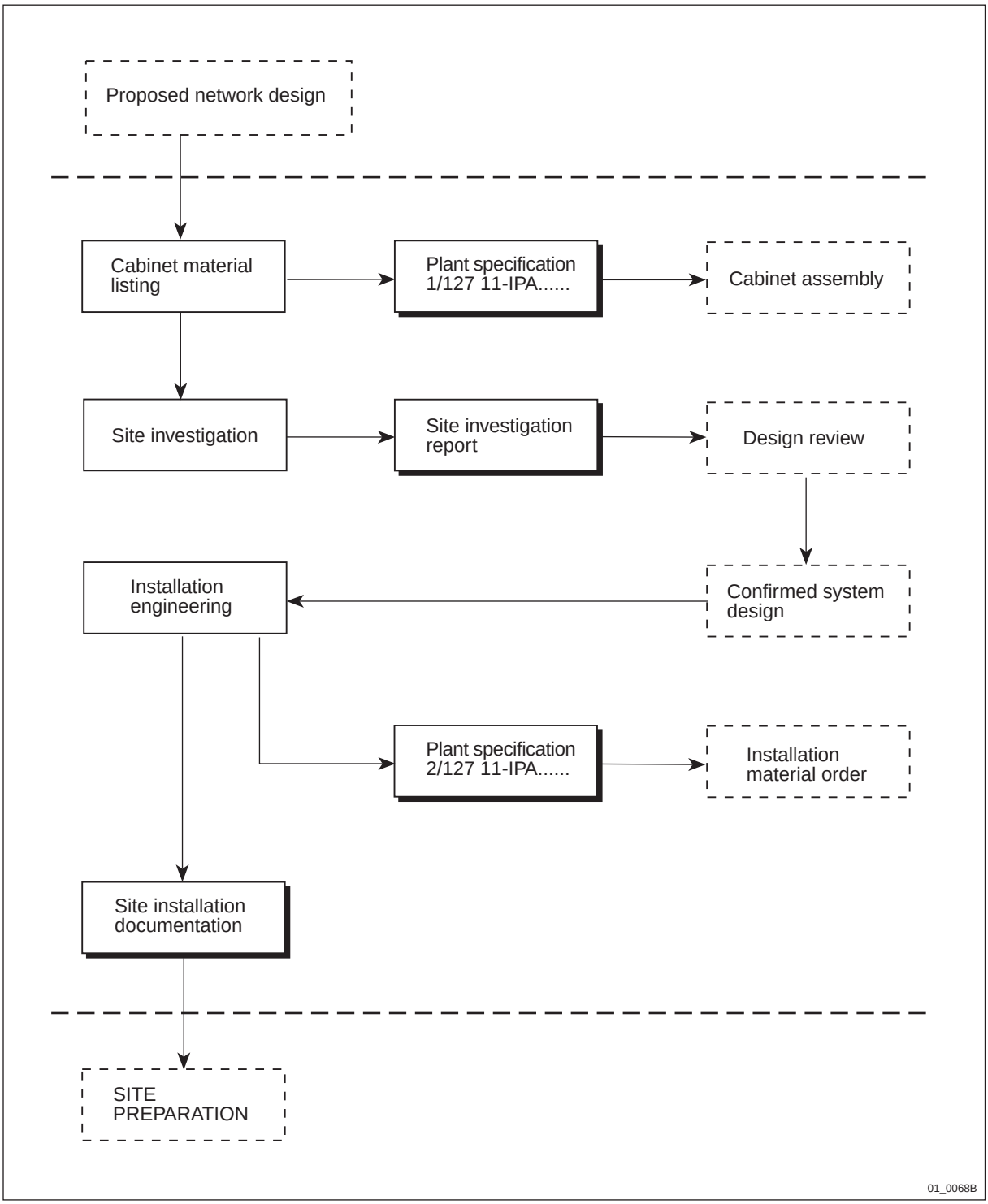

Figure 13 Planning overview

4.4.1 Basic Information

The necessary information for planning of a site is made up of:

- The technical specification in the contract regarding the base station.
- Information about the transmission network standard.
- Information about the network plan.

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- Proposed network design (further explained below).

4.4.2 Proposed Network Design

The proposed network design, *see Figure 13 on page 52*, contains the results from the Radio Survey and the Propagation Predictions. Site Planning will make use of the following parameters to plan the site:

- Site location - giving the address or geographical coordinates for the desired site.
- Base station configuration - giving the base station configuration, for example, number of TRXs, antenna configuration or antenna gain.
- Number of cells - the number of cells at a particular site (1-sector, 2-sector or 3-sector) based on the desired traffic capacity at the site.
- Antenna directions - the actual direction of separate antennas.
- Antenna height - based on the coverage prediction a desired antenna height is given.

4.5 Site Investigation

The purpose of the site investigation is to investigate and record all factors that may have an influence on the project and to make a report that will be the basis for an agreement on the Confirmed System Design with the customer.

4.5.1 Preparations

The preparations start once the contract has been signed and include the following activities:

- Contact with the Network Design Department to obtain the proposed network design.
- Obtaining permission from the customer to visit the sites. Permits and other arrangements prescribed by security regulations must be requested through the customer.
- Collection of all necessary information about the project.
- Collection of all required equipment and documents.
  - A list of necessary survey tools is found in *chapter Tools and Instruments*.
- Practical arrangements for visiting the sites.
- Obtaining a map to mark the sites on.

Prepare a site visit binder with dividers for each site. Prepare and insert checklists for each site. An example of a checklist can be found in the binder:

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Rules and Methods for Installation Engineering *EN/LZB 119 2935/6*

Fill in the checklist with known data about the site.

4.5.2 Site Visits

The purpose of site visits is to collect and record, on the spot, all data that may have an influence on installation engineering and site preparation. The following actions should be taken on site:

- Fill in the address/location in the checklist.
- Locate the site on the map.
- Make a sketch of the premises/rooftop including existing structures. Take measurements.
- Indicate the north direction on the sketch.
- Select a location for the RBS equipment.
- If the RBS is to be located indoors, make a floor plan sketch and indicate north on the sketch.
- If an indoor distributed antenna system is to be installed, floor plan drawings must be obtained for the entire coverage area.
- Note heights of supporting structures and buildings that are going to be used for the installation.
- Take measurements supporting structures that are going to be used for installation.
- Measure the length of the cable way for antenna cables if external antennas are to be used.
- Investigate from where the mains power can be supplied and if it has capacity for the increased load.
- Investigate from where the transmission network can be brought into the site.
- Investigate from where the base station can be earthed.
- Take photographs to back up the notes.

4.5.3 Site Investigation Report

The Site Investigation Report consists of one or more binders with dividers for each site. The report consists of two parts:

- Site documents
- Site preparations

The Site Investigation Report is handed over to Design Review and will form the basis for a Confirmed System Design agreement with the customer.

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Site Documents

Normally, the Site documents consist of:

- Site data (127 04 - Configuration data).
- A site layout drawing (153 38 - Situating plan).
- Antenna arrangement drawing (153 12 - Antenna placement information) if external antennas are to be used.
- Cabinet material list (1/127 11 - Plant specification).

4.5.4 Site Preparation

The Site Preparation document describes the scope of the civil engineering works needed on each site and who is responsible for them. For example it will define the following responsibilities:

- Mounting structure for base station and antennas
- AC mains power
- Transport network
- Necessary permits

4.6 Installation Engineering

The purpose of Installation Engineering is to produce site installation documentation. This documentation must correspond with the contract and the confirmed system design.

The site installation documentation is collected in one or more binders. When a site or the project is finished, the site installation documentation is updated with any changes agreed upon during the installation phase. It then becomes "as-built" documentation to show the actual installation at each site.

4.6.1 Cabinet Material Listing

The ordering information document contains instructions on how to list the equipment for RBS 2302. See:

Ordering Information for RBS 2302 and Maxite — *131 62-HRB 105 112/06*

Make sure that the document has the latest revision state and follow the instructions in the document.

The revision state can be checked in the Ericsson PRIM database.

Plant Specification

The list of equipment selected from the ordering information is put into a Plant specification, numbered with the site number.

Example: 1/127 11-IPA 110 1001

In this case the document prefix indicates that this is part of a plant specification divided into several parts. This part is the RBS equipment,

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but there might also be need for a plant specification for the installation material or other auxiliary equipment, (2/127 11-.... etc.).

The plant specification should contain the following headings:

Item	Product denomination	Product number	Quantity

The plant specification is used for Site Investigation and Installation Engineering.

RBS equipment is factory equipped and tested to fit the actual site. In this case the Plant specification is delivered to the Cabinet Assembly and Test process.

4.6.2 Installation Material

Based on the findings during the site investigation, any additional installation material and supplementary equipment has to be specified.

A helpful tool is the Standard Site Material catalogue which contains a number of kits. Every site is individual and the contents of the various kits have to be verified against the actual site layout and requirements.

Installation Material List

Installation material is listed in a Plant specification, numbered with the site number.

Example: 2/127 11- IPA 110 1001

In this case, the document prefix indicates that this is part two of the plant specification (installation material).

4.6.3 Site Preparation

Any civil works such as modification of existing buildings, masts or antenna structures have to be specified and given to a contractor for design and execution.

4.6.4 Site Installation Documentation

The site installation documentation is collected in one binder per site and is given to Site Preparation. The binder is given a product number containing the prefix LZB.

Example: LZB/IPA 110 1001

The prefix LZB corresponds to ABC class LZB: Document collections, and will indicate that this is a document collection for the site IPA 110 1001.

Depending on the type of installation, the binder will contain more or less elaborated documentation. The list below is an example of a complex installation:

- List of documents (001 51- Document list).

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- Cabinet material list (1/127 11- Plant specification).
- Installation material list (2/127 11- Plant specification).
- Site data (127 04- Configuration data).
- Site layout (153 38- Situating plan). The earthing system must be indicated on this drawing for Site Preparation.
- Antenna layout (153 12- Antenna placement information).
- Acceptance certificate (179 61- Certificate of conformance) to be signed by the customer and Ericsson.
- Test report (152 83-) to be filled in by the tester.

4.6.5 Site Design Documentation

Changes that occur during installation are recorded on the drawings by the installer and given to Installation Engineering.

Installation Engineering incorporates these changes into the drawings and compiles an "as built" version of the Site Installation Documentation. This version is now called Site Design Documentation, and constitutes the reference documentation for this particular site.

4.7 Site Requirements

This part describes in general terms the requirements for the base station site. Requirements related to dimensions, power and so on, are described in *chapter Product Data*.

The proposed network design shows the site locations in general. The exact site position depends on available space and possibilities to place a site in that area. The network design will also show at which height antennas will be placed, this is the same as the installation height of the RBS.

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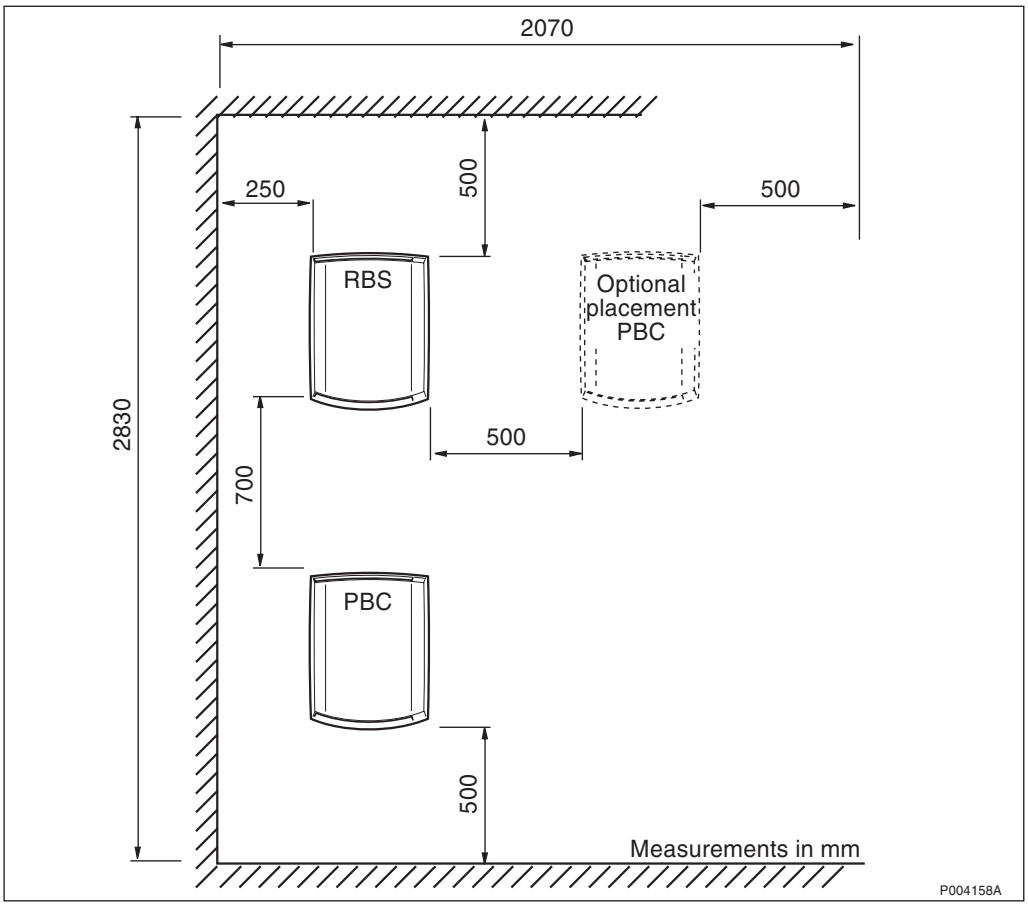

Figure 14 Total space requirements

This figure shows the total space required for one RBS and one PBC mounted above each other, or, as an option, beside each other. To ensure sufficient ventilation for the cabinets these space requirements must be fulfilled.

Space requirements are detailed in *chapter Product Data*. Furthermore the site must be supplied with the following facilities:

- Access to AC mains power
- Access to the transmission network
- Access to earth terminal

4.7.1 Permits

The need for planning permits from local planning authorities has to be investigated.

Since the base station is a small unit it is in most cases exempt from the need for the planning permit.

A lease contract or permission to install the base station has to be agreed upon with the owner of the building structure that is going to be used.

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4.8 Earthing and Lightning Protection

RBS 2302 must be connected to separate site earth. This may consist of an existing lightning protection or an earth electrode. The design of earth electrodes can be found in:

General Installation Instructions *LZN 302 49*

The requirement is also valid for indoor installations and the aim is to ensure the proper function of the overvoltage protectors.

4.9 RBS 2302 Overview

4.9.1 Base Station RBS 2302

RBS 2302 is a member of the RBS 2000 family of base stations. It is a small "Micro base station" that can be placed in both outdoor and indoor environment.

The base station contains one or two low-power transceivers, and can be equipped with integrated antennas. Integrated sector or omnidirectional antennas are available for that purpose.

The purpose of the RBS as a stand alone product is to supply "hot spot" capacity in small areas.

Versions are available for the 900, 1800 and 1900 MHz bands.

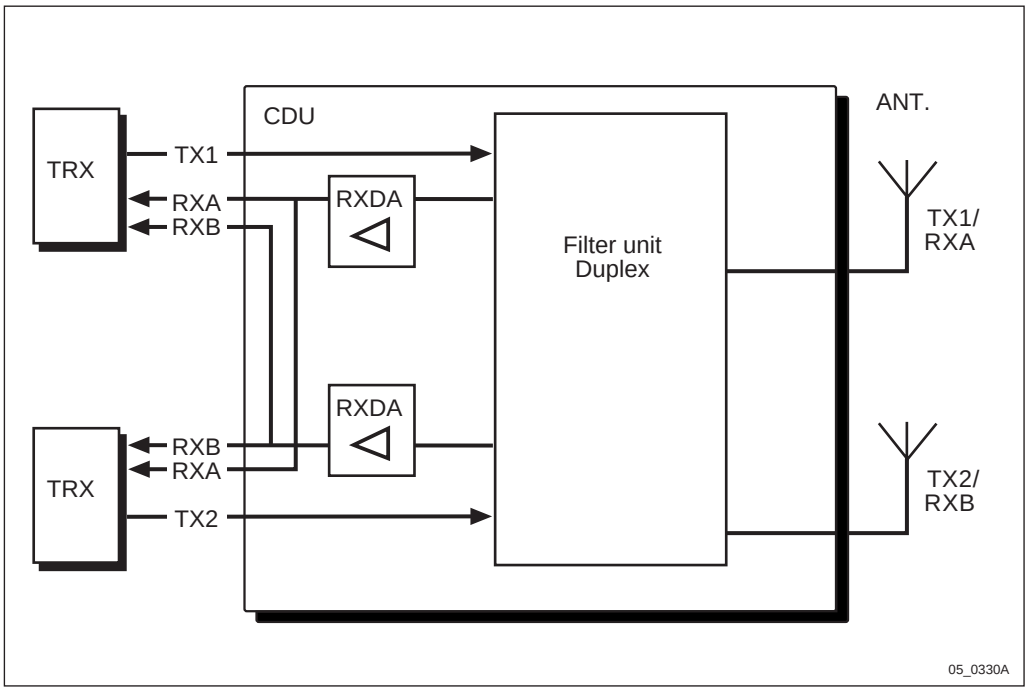

Figure 15 Block diagram of RBS 2302

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4.9.2 Power and Battery Cabinet PBC

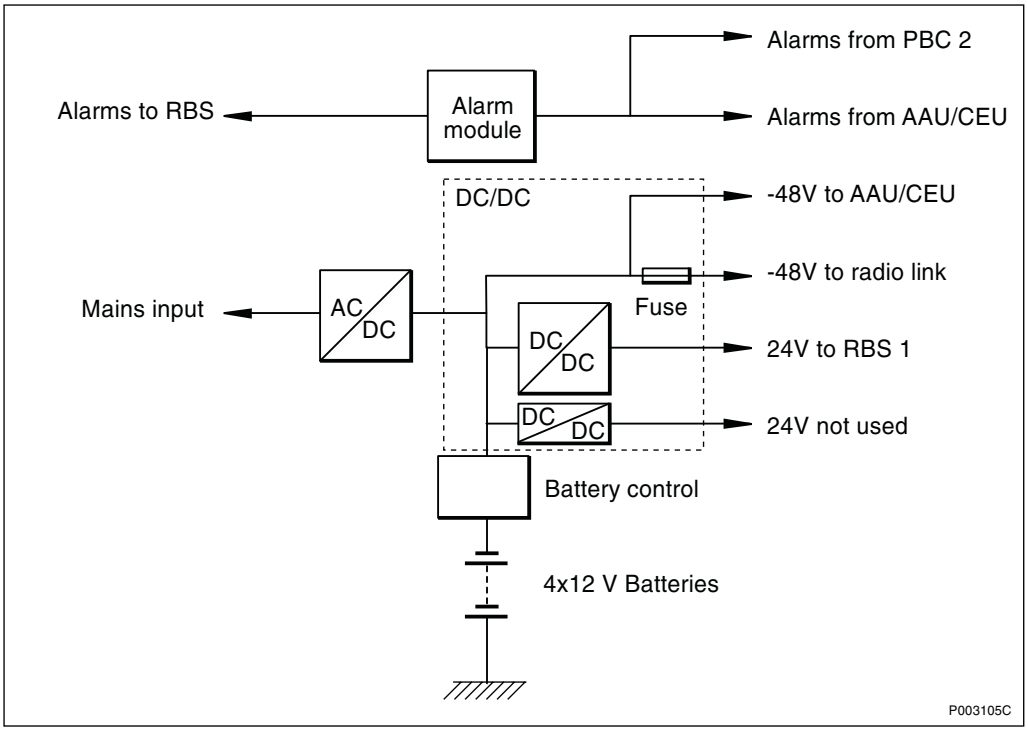

Figure 16 Block diagram of Power and Battery Cabinet

The Power and Battery Cabinet is an optional battery back-up for RBS 2302.

The PBC can supply RBS 2302 with extended DC back-up. PBC is also used in Maxite™ configuraions as a power supply and supervision unit.

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4.10 Configurations

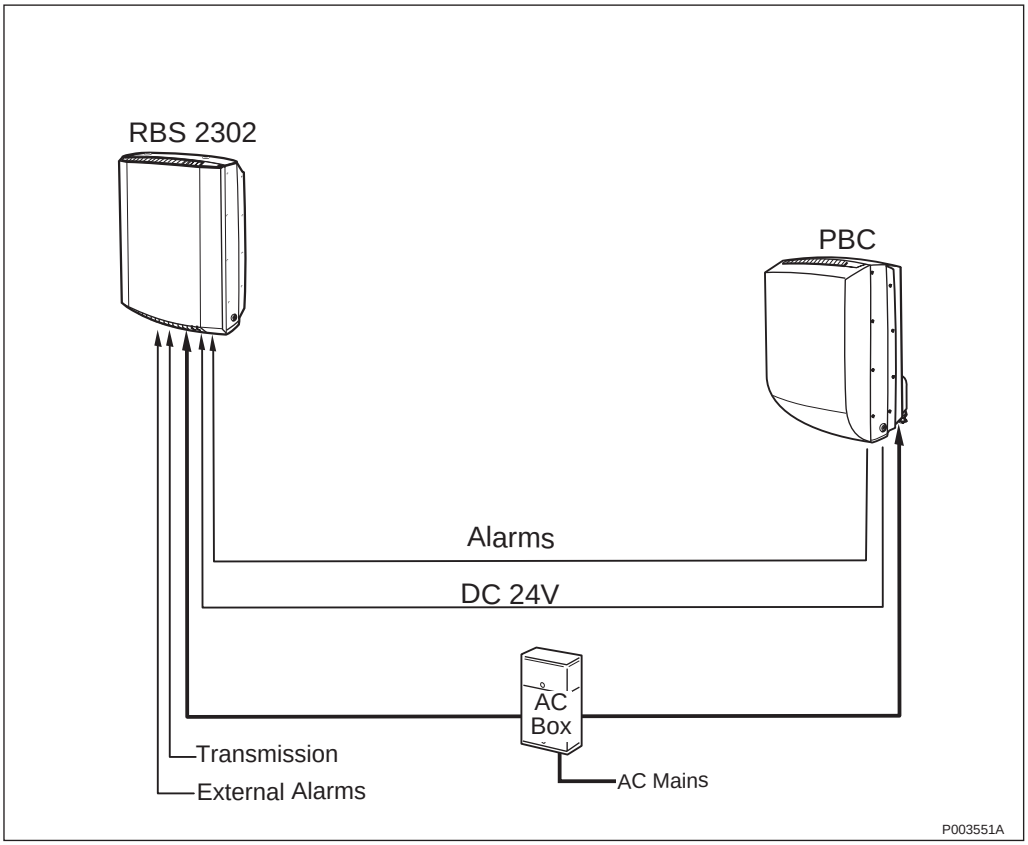

Figure 17 Configuration with 2 TRX

The basic Micro RBS configuration is a two TRX configuration and can be optionally supplied with a PBC.

- one PBC
- one RBS 2302

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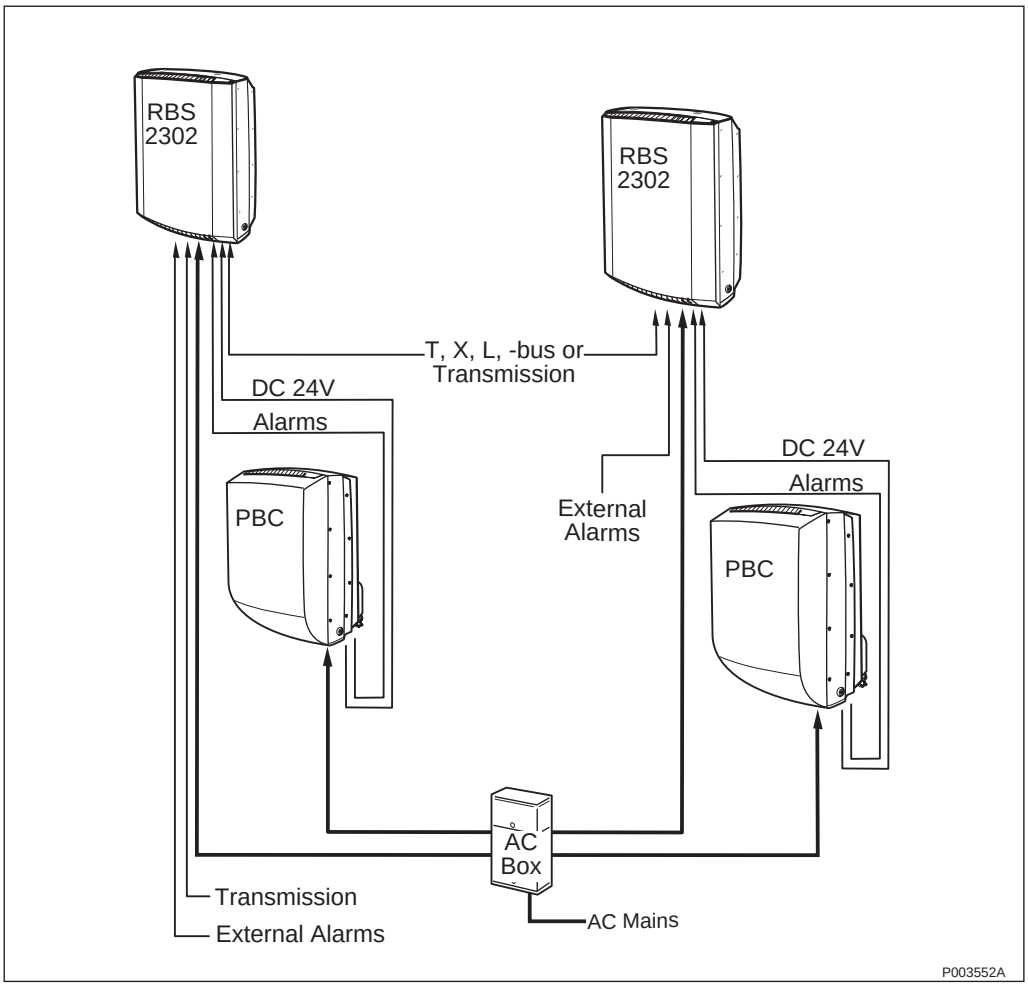

Figure 18 Configuration with 4 TRX

This configuration can be expanded to 4 TRX. The configuration will then consist of:

- two PBC
- two RBS 2302

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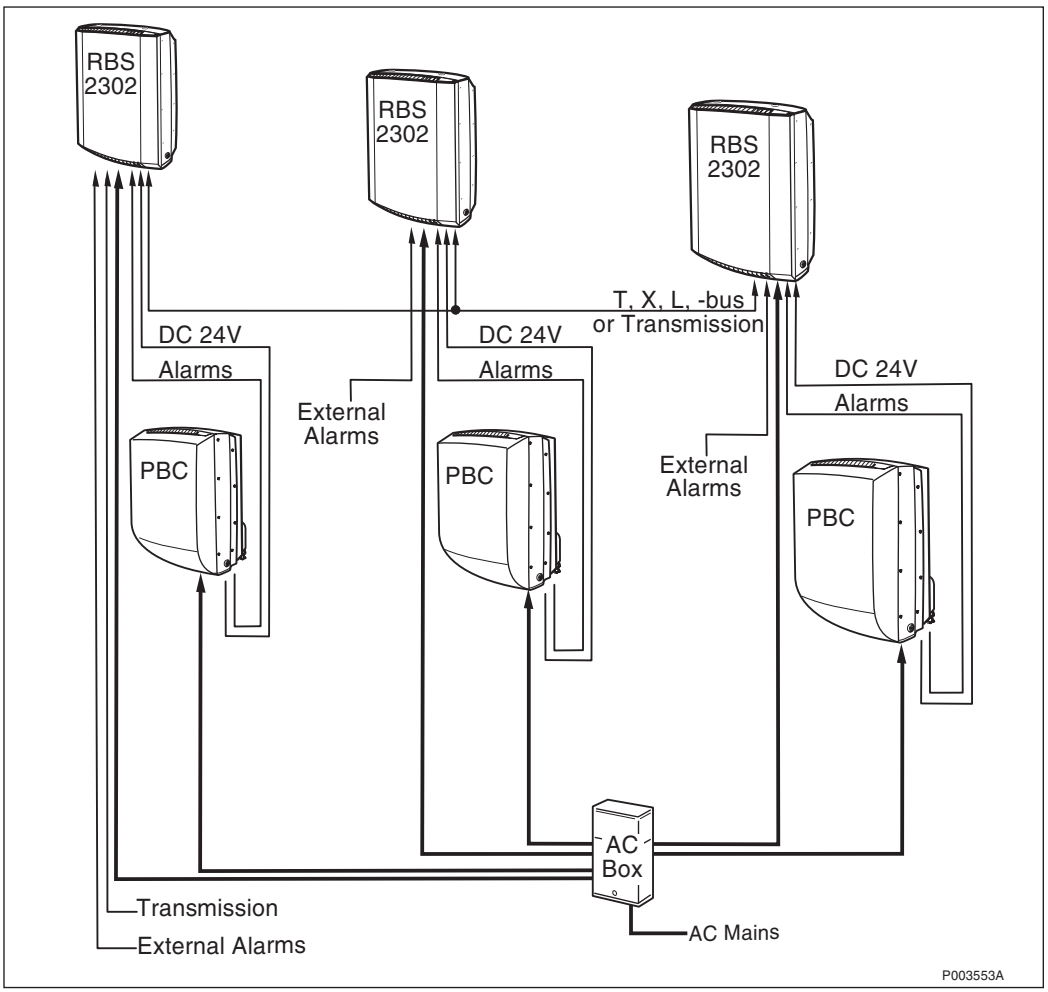

Figure 19 Configuration with 6 TRX

The maximum configuration will be a six TRX configuration. It will consist of:

- three PBC
- three RBS 2302

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5 Installation of RBS 2302

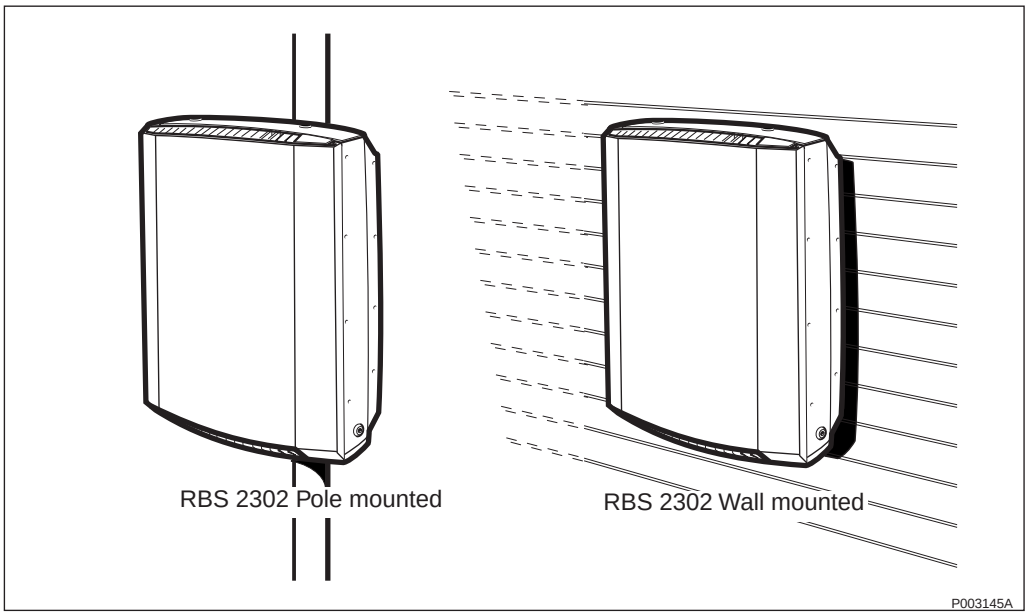

Figure 20 Installation alternatives

5.1 Competence requirement

In order to do installation work according to this manual in a safe and professional way, the work shall be done by skilled personnel.

The following qualifications are minimum requirements:

- Good understanding of radio and telephone engineering.
- Good understanding of engineering English.

5.2 Preconditions

Ensure that the following conditions are met:

- Site access permission received.
- Ordered RBS 2302, equipment, specified tools and other necessary facilities have been delivered.
- Electrical ducting is ready and AC mains power is available.
- Earth Point is available.
- Transmission line to BSC is available.
- During bad weather conditions it may be necessary to protect the cabinet during installation.
- When the cabinet is mounted outdoors, it must not be left without power for more than 48 hours. This requirement is caused by the risk of humidity damages.
- Always use an approved antistatic bracelet to avoid damage to components mounted on printed board assemblies.

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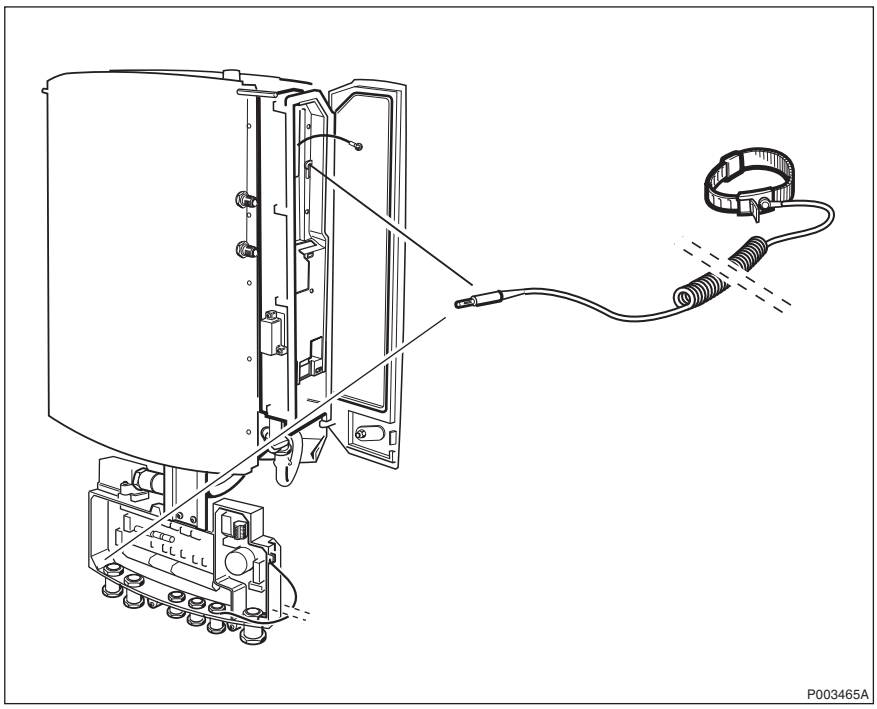

Figure 21 Connecting the ESD wrist strap

5.2.1 Preconditions for wall-mounted RBS 2302

- Make sure that the selected bolt is suitable for the type of wall material that the cabinet is to be mounted on.
- Make sure that the wall surface is even.

5.2.2 Preconditions for pole-mounted RBS 2302

- The pole must have the required dimension (60–114 mm in diameter).

5.2.3 Documents

Ensure that the following documents are available:

- Filled in and approved record prepared during site preparation.
- Site installation documentation prepared by the Installation Engineering department.

General Installation Instructions *LZN 302 49*

5.2.4 Tools and Instruments

The tools needed for the RBS 2302 installation may be found in the *chapter Tools and Instruments*.

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Table 5 Recommended Torque

Dimension	**Torque**				**Notes**
	Ncm	Nm	lbf-in	lbf-ft	
M3	110 +/- 7	-	9.7 +/- 0.6	-	
M3	80 +/- 7	-	7.1 +/- 0.6	-	Reduced for plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	190 +/- 15	-	16.8 +/- 1.3	-	Reduced for plastic covers
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	

5.3 Overview

The recommended installation procedure includes the following activities:

- Unpack and verify against the packing list that the correct material has been delivered.
- Mount the RBS 2302 mounting plate.
- Mount the RBS 2302 mounting base.
- Mount the Power Supply Adapter(if applicable).
- Connect earth and lightning protection.
- Connect external cables.
- Mount the cabinet.
- Connect internal cables.
- Mount the antenna.
- Mount the sunshields.

5.4 Unpacking

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

In order to avoid damages to components due to electrostatic discharges during unpacking, make sure not to come in contact with the connectors on the cabinet

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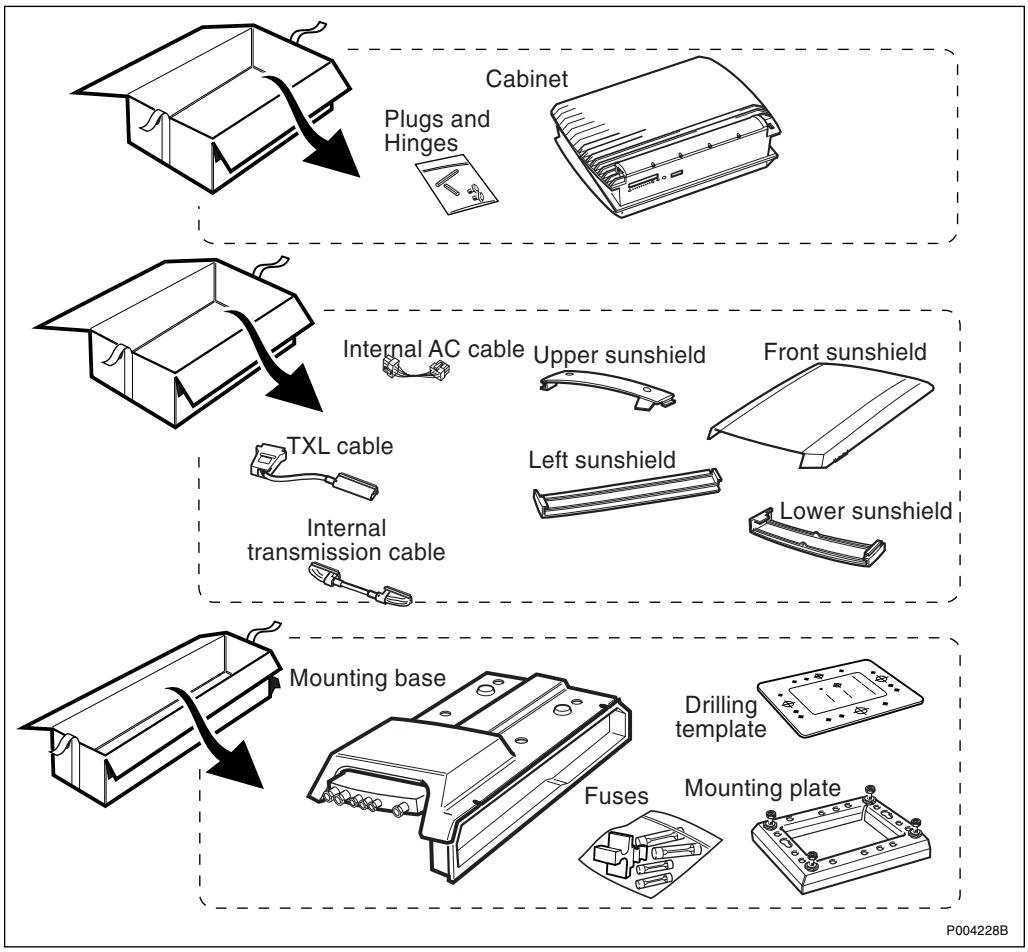

Figure 22 Unpacking the cabinet, sunshields and cables, and the mounting base

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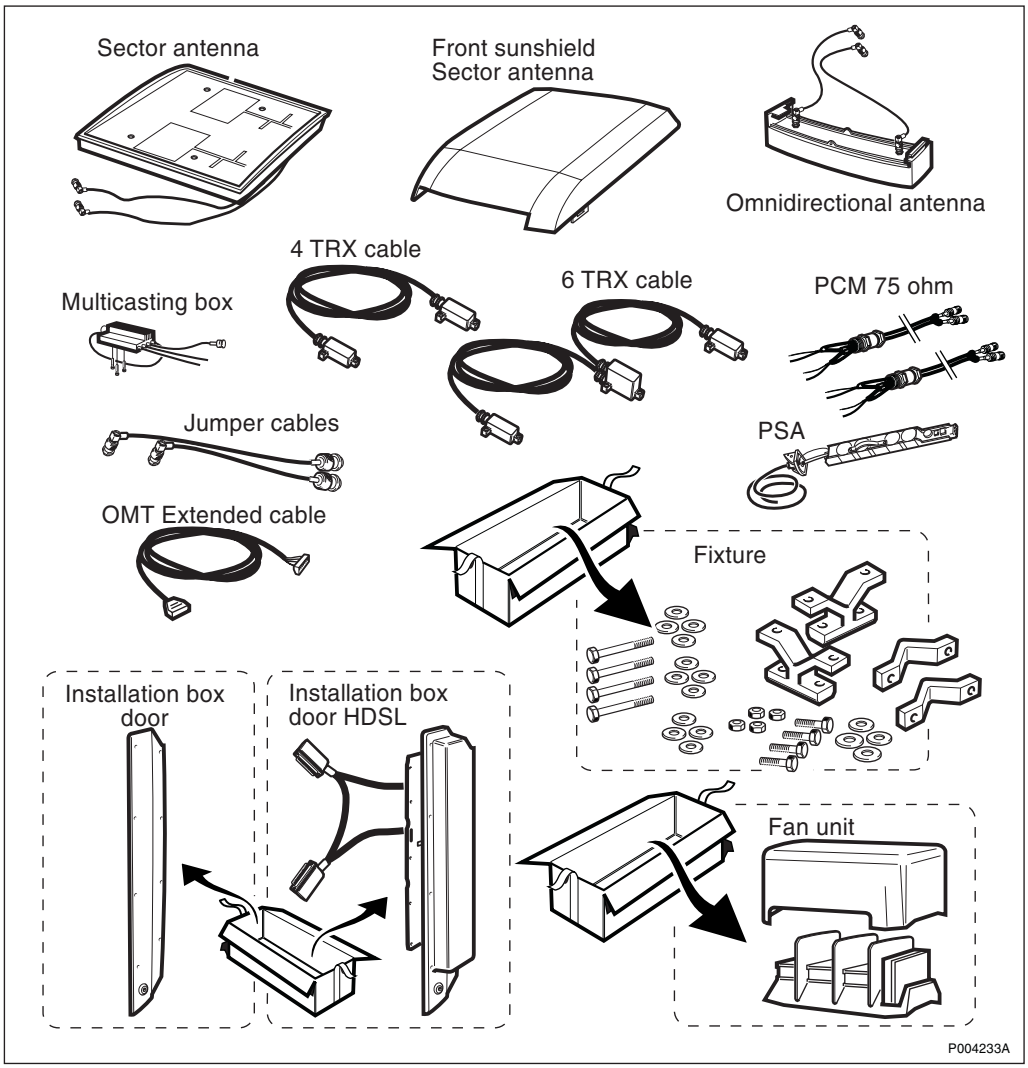

Figure 23 Unpacking the optionals

Unpack and ensure that the correct material has been delivered. If the material is damaged make an immediate complaint to the supervisor/ transport company.

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5.5 Mounting the Mounting Plate

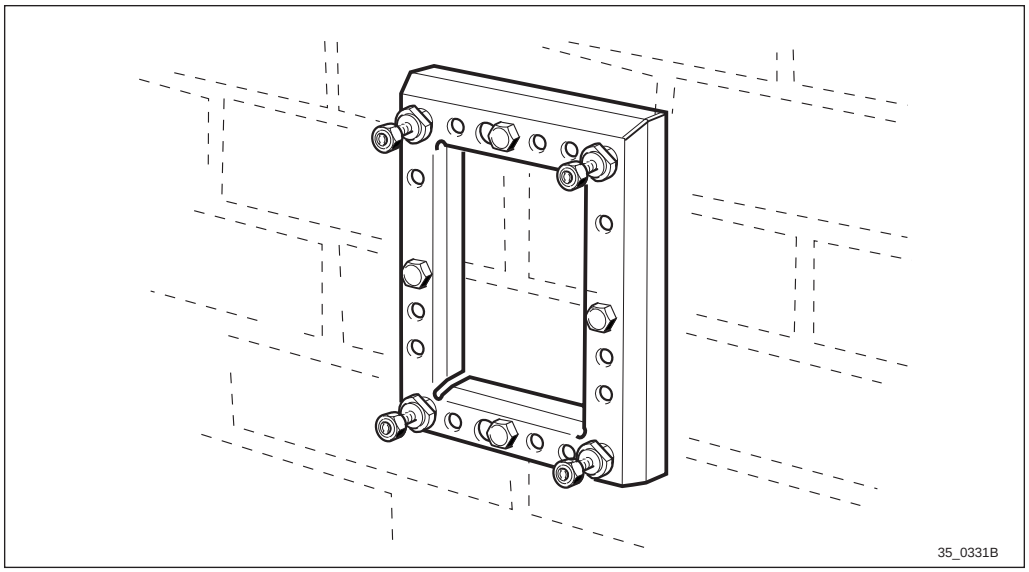

Figure 24 Mounting the mounting plate

If the installation site is at such height that work cannot be done without aid, a skylift or scaffold must be used. For safety reasons a step ladder should only be used as an exception.

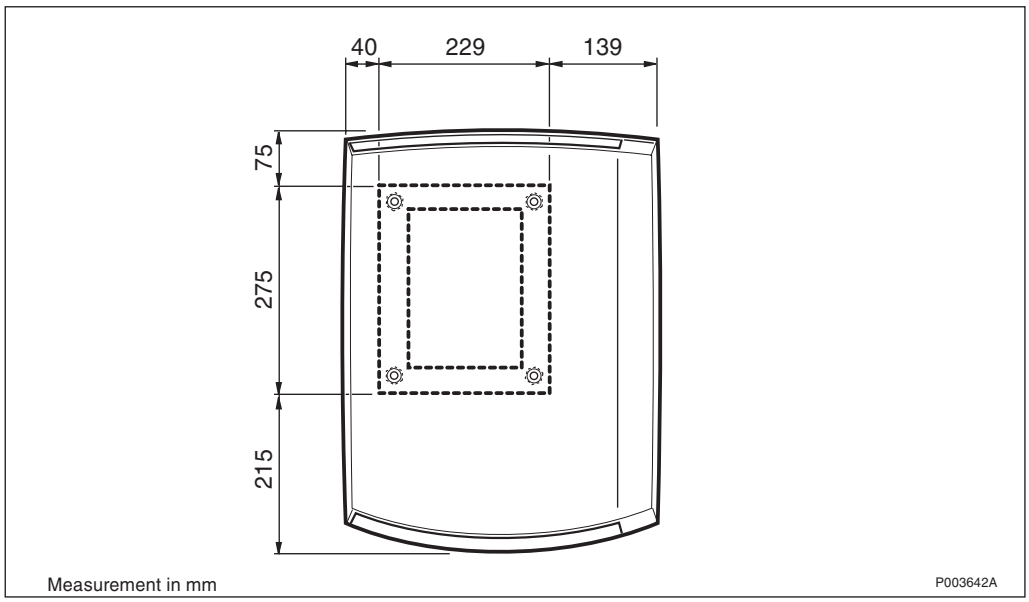

Figure 25 Mounting plate and equipment contour, front view

Figure 25 on page 70 shows the dimensions of the equipment in relation to the mounting plate. This is to determine a suitable alignment with several units or existing equipment. For more information *see chapter Product Data* and *chapter Site Planning and Requirements*.

5.5.1 Mounting the Mounting Plate on a Wall

1. Place the mounting plate drilling template in the position where the RBS 2302 is to be situated.

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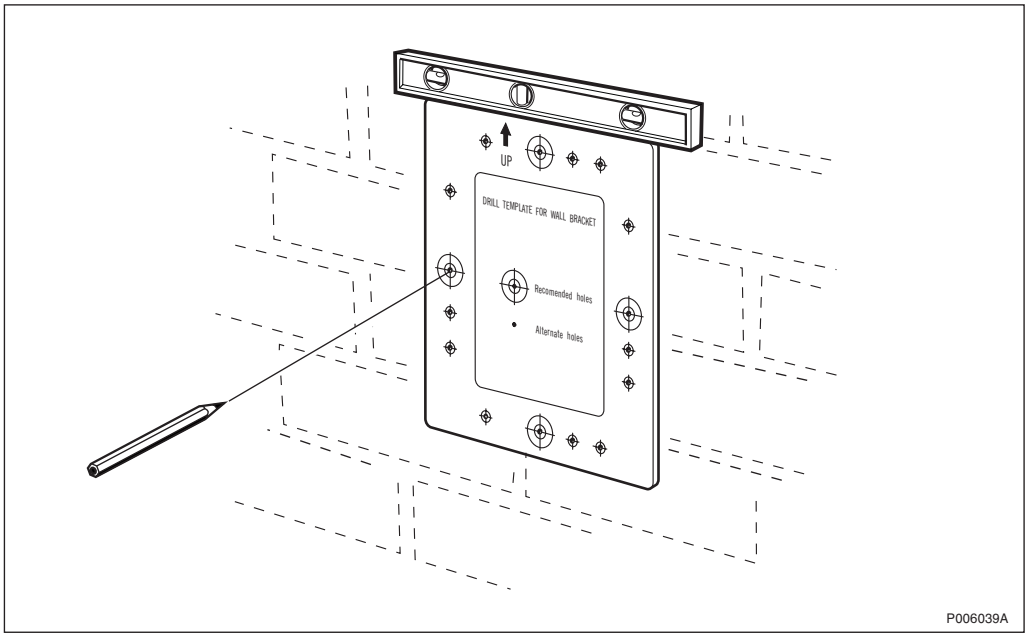

Figure 26 Marking the holes

2. Check with a spiritlevel that the drilling template is placed in a horizontal position.
3. Use a pen to mark the position of the holes that are to be drilled.
4. Remove the template and drill the holes for the fasteners best suited for the wall material.

Note: The mounting plate must not be used as a drilling template in order not to damage the rust protection surface.

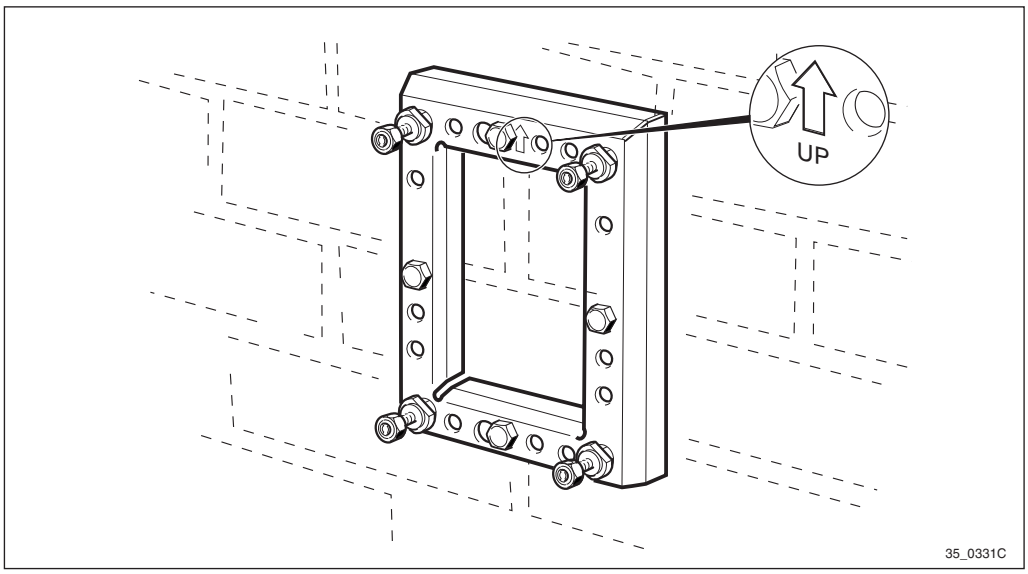

Figure 27 Mounting plate

5. Mount the mounting plate and secure it into position with all screws.

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6. Unscrew the four nuts on which the mounting base is to be hung, until only a few threads remain.

5.5.2 Mounting the Mounting Plate on a Pole

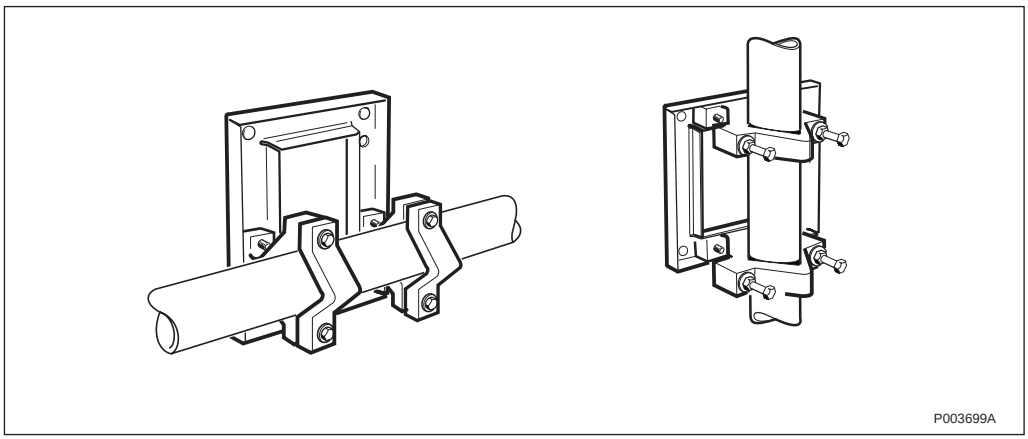

Figure 28 Mounting alternatives

The mounting plate may be mounted on a vertical pole or on a horizontal pole by using different holes.

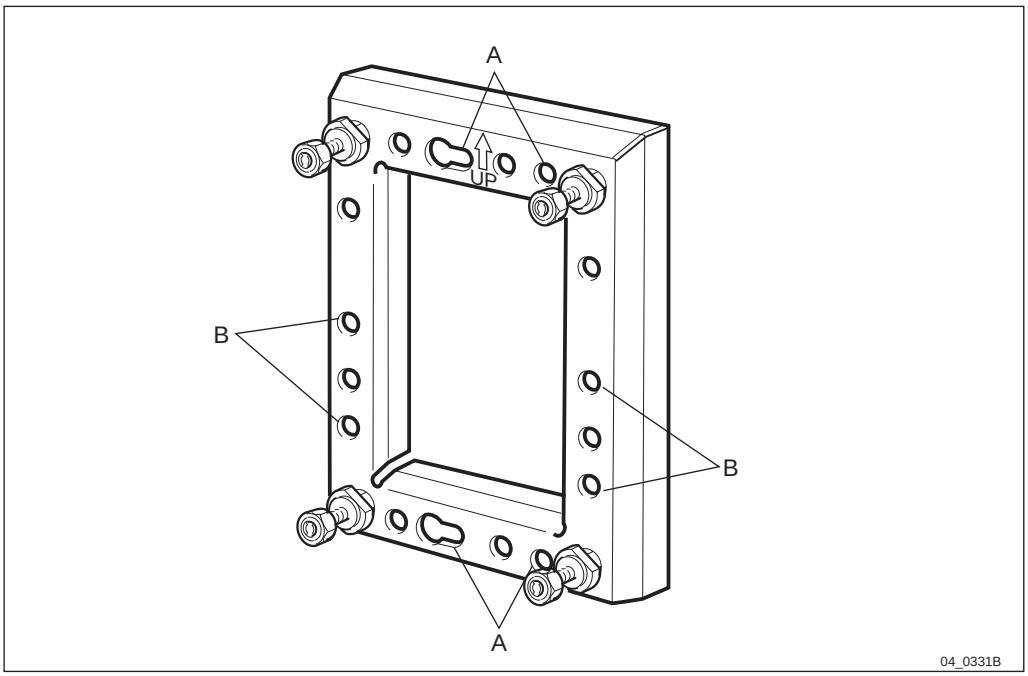

Figure 29 Choosing the appropriate holes

A Holes to be used for vertical pole

B Holes to be used for horizontal pole

1. Choose the appropriate holes (horizontal/vertical).

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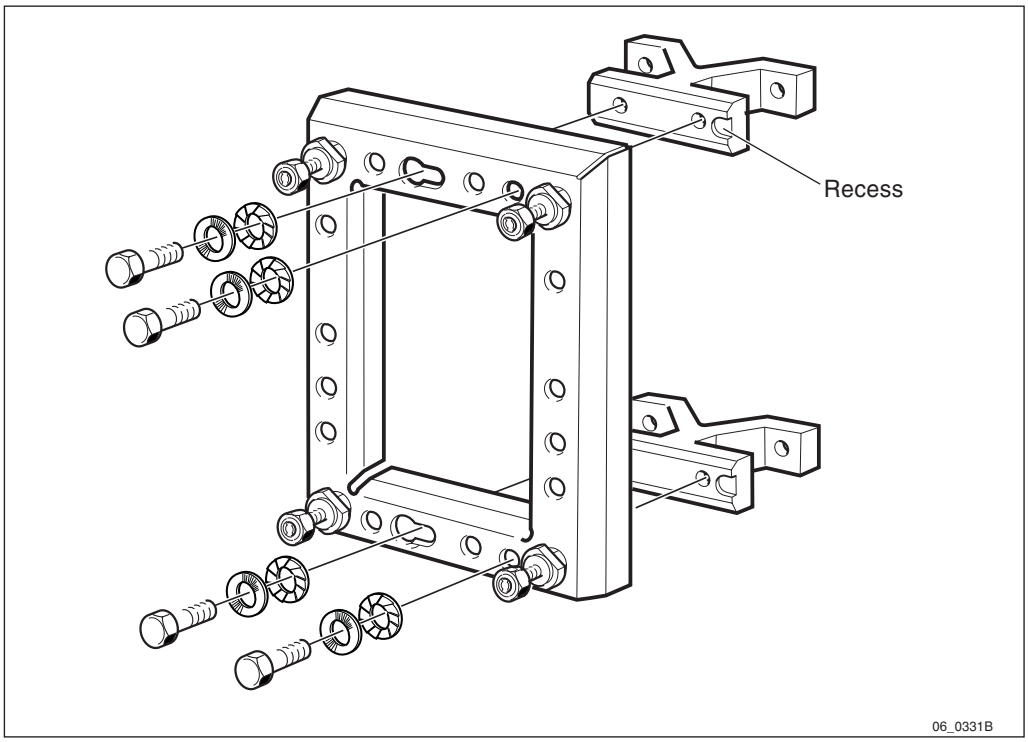

Figure 30 Fastening the clamps and mounting the washers

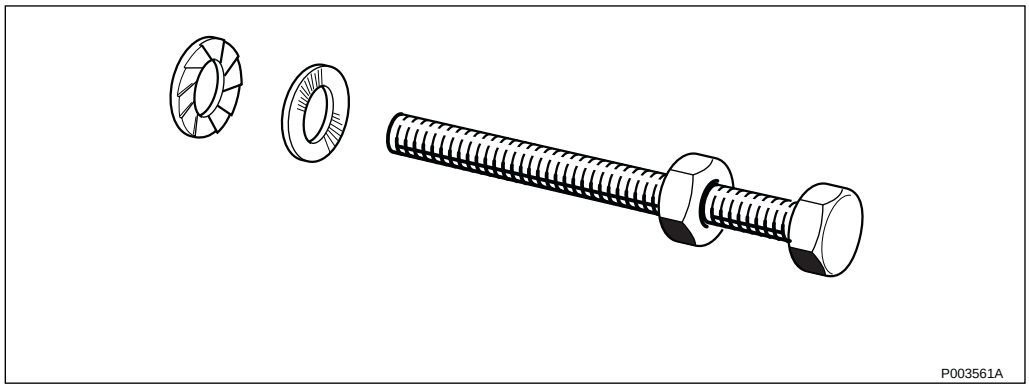

Figure 31 Mounting the washers

2. Make sure that the washers are mounted correctly *see Figure 31 on page 73*.

3. Fasten the two clamps with the screws and washers. Ensure that the recess is attached at the correct place.

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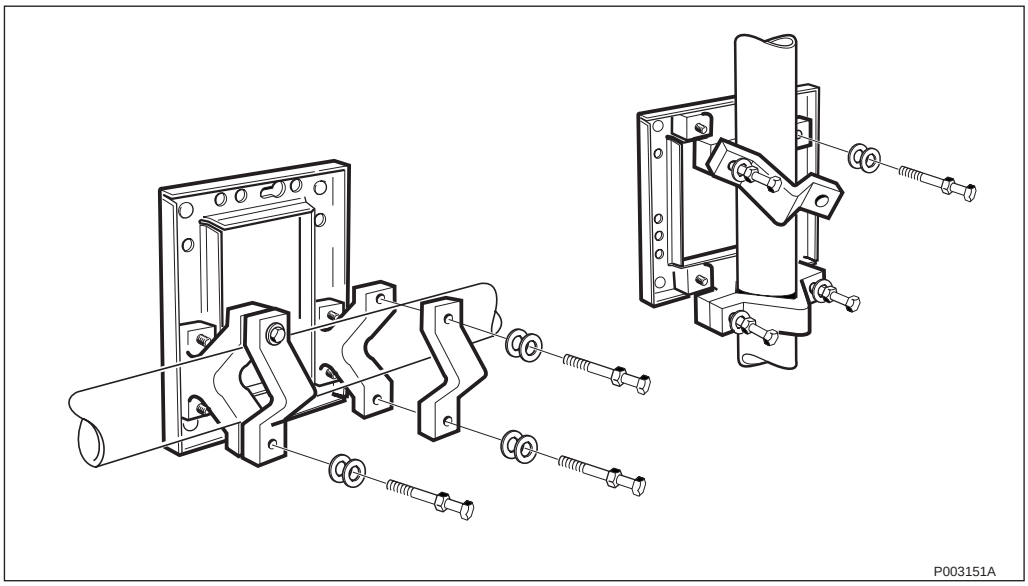

Figure 32 Placing the mounting plate correctly

4. Place the mounting plate at the correct height on the pole and mount the clamp halves.

5. Make sure that the washers are mounted correctly *see Figure 31 on page 73*.

6. Mount the screws and tighten them alternately (right and left side) in order to avoid bending the screws.

5.6 Mounting the Mounting Base

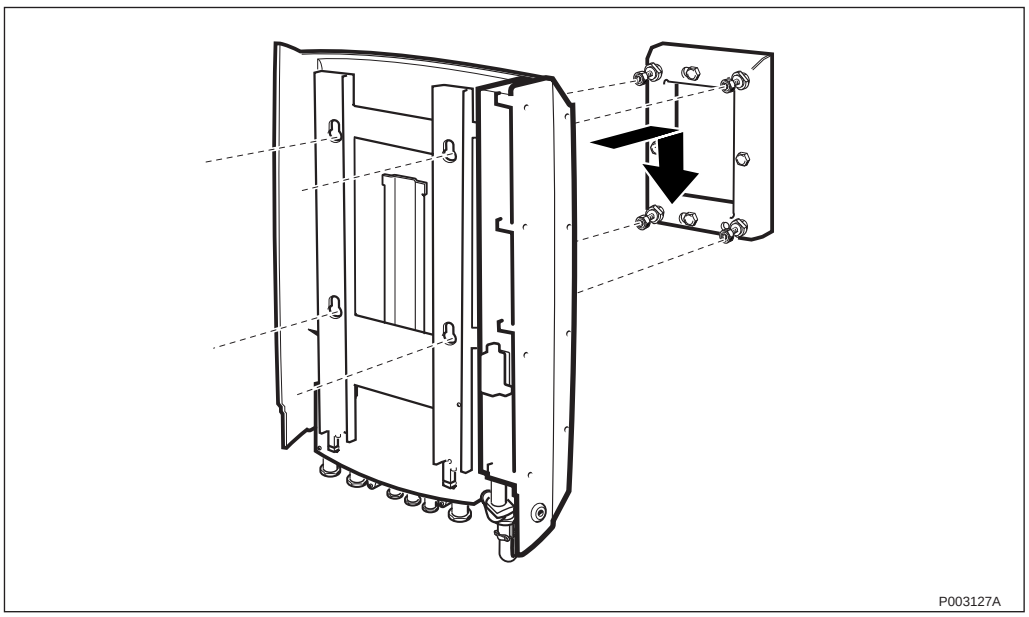

Figure 33 Mounting the mounting base on the mounting plate

1. Mount the mounting base on the four screws situated on the mounting plate. Ensure that the fastening screws are properly fitted in the key holes.

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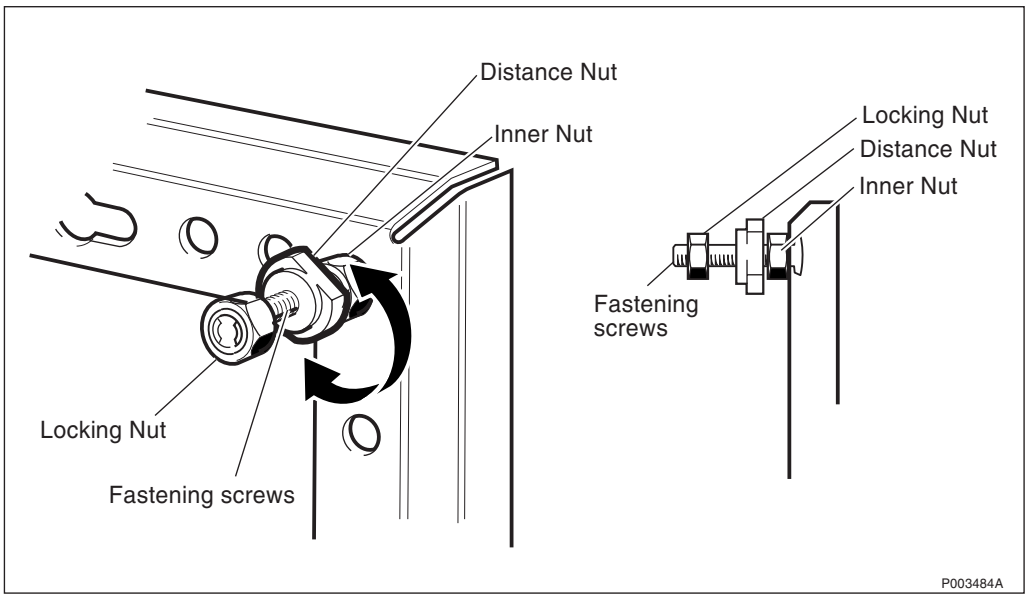

Figure 34 Adjusting the distance nuts

2. Alter the vertical inclination of the mounting base relative to the mounting plate, by adjusting the four distance nuts. This can only be done with the mounting base dismounted. The locking nuts may remain on the fastening screws.

Note: Do not loosen the inner nuts. The inner nuts secure the fastening screws in the mounting plate.

3. When the mounting base is correctly adjusted, tighten the four locking nuts.

5.7 Mounting the Installation Box Door

Note: This section is also applicable when a HDSL door is used.

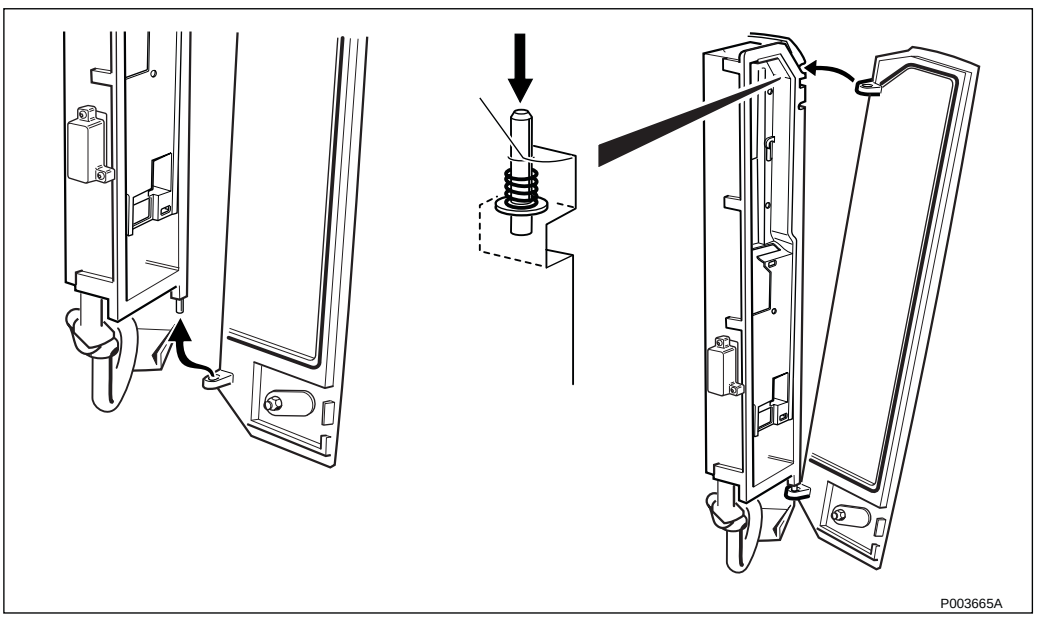

Figure 35 Mounting the installation box door

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1. Hook the lower left hand corner of the door on to the installation box.
2. Press down the spring locking pin on the upper right hand corner of the installation box.
3. Insert the installation box door by pushing the upper left hand corner of the door into position. Make sure that the spring locking pin snaps into position.

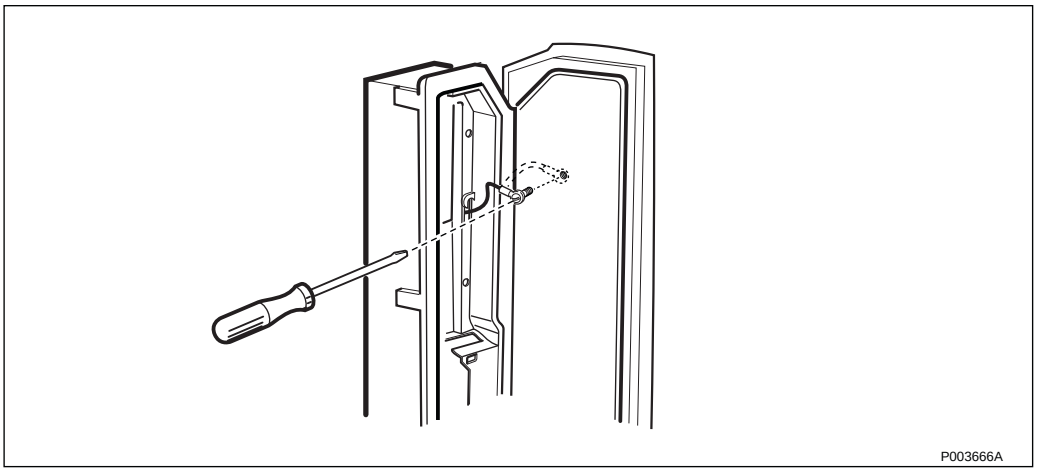

Figure 36 Mounting the earth cable, Installation Box Door without HDSL

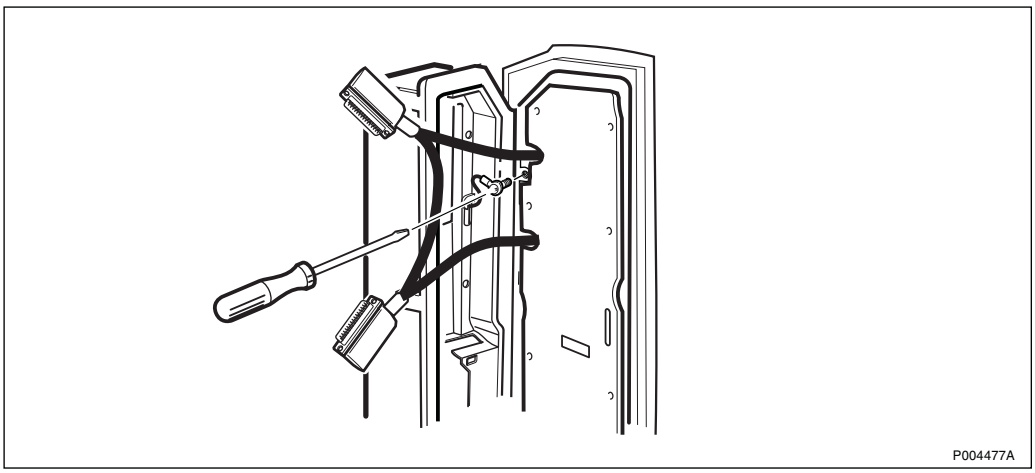

Figure 37 Mounting the earth cable, Installation Box Door with HDSL

4. Mount the earth cable on the installation box door by screwing the torx screw into position.

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5.8 Installation Box

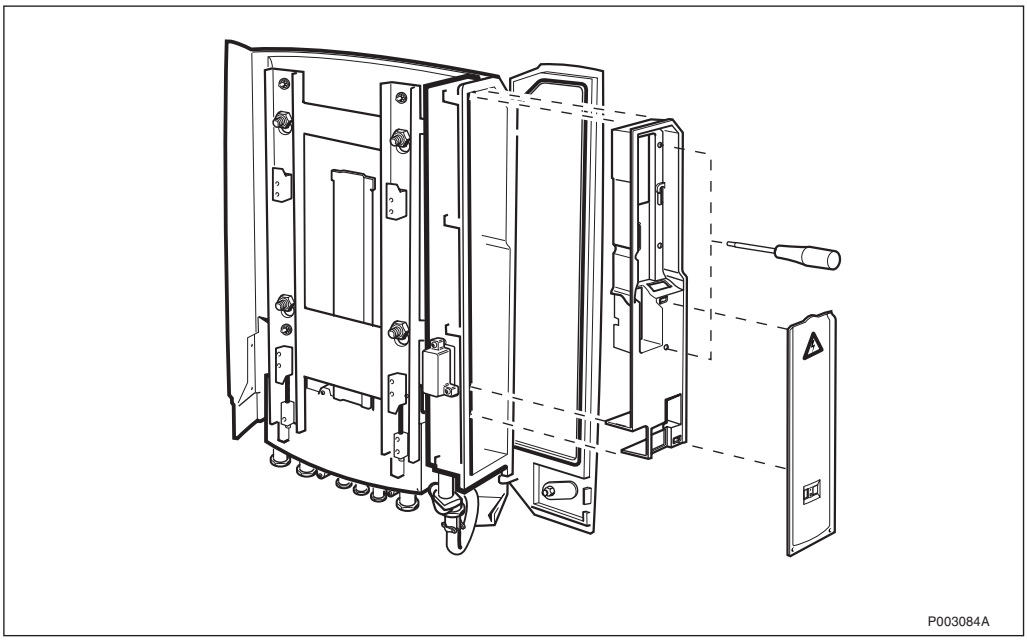

Figure 38 Removing the protection covers

1. Remove the outer protection cover by snapping it off, and let the cover hang in its cord.
2. Loosen the inner protection cover by unscrewing the 2 torx screws and let the cover hang in the earth wire. The voltage selector is now accessible.

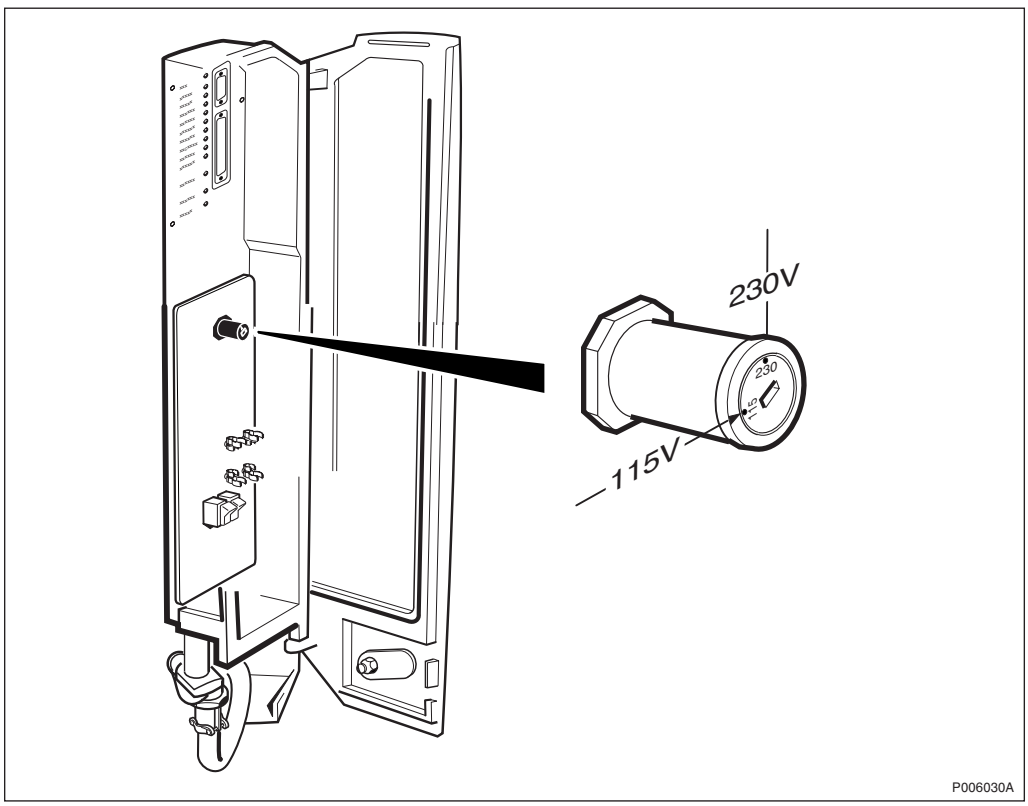

Figure 39 Checking the voltage selector

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3. Set the voltage selector to the correct value, 115 V or 230 V. Compare with the Site Documentation to verify the voltage.

4. Remount the inner protection cover.

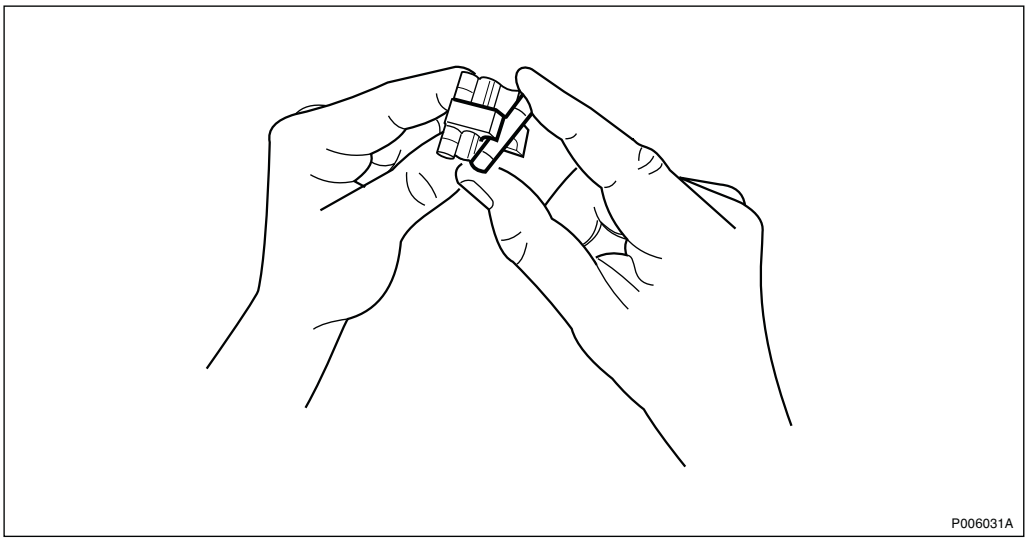

Figure 40 Snapping the fuses into position

5. Snap the 2 fuses onto the fuseholder. Make sure that the correct fuses are used, *see table below*.

Table 6

Voltage	**Fuses Data**	**Dimension**
100-127 V AC	Ceramic Slow Blow 8 AT 250 V(1)	6.3x32 mm
200-250 V AC	Ceramic Slow Blow 6.3 AT 250 V(1)	5x20 mm

(1) Fuse according to standard EN 60127.

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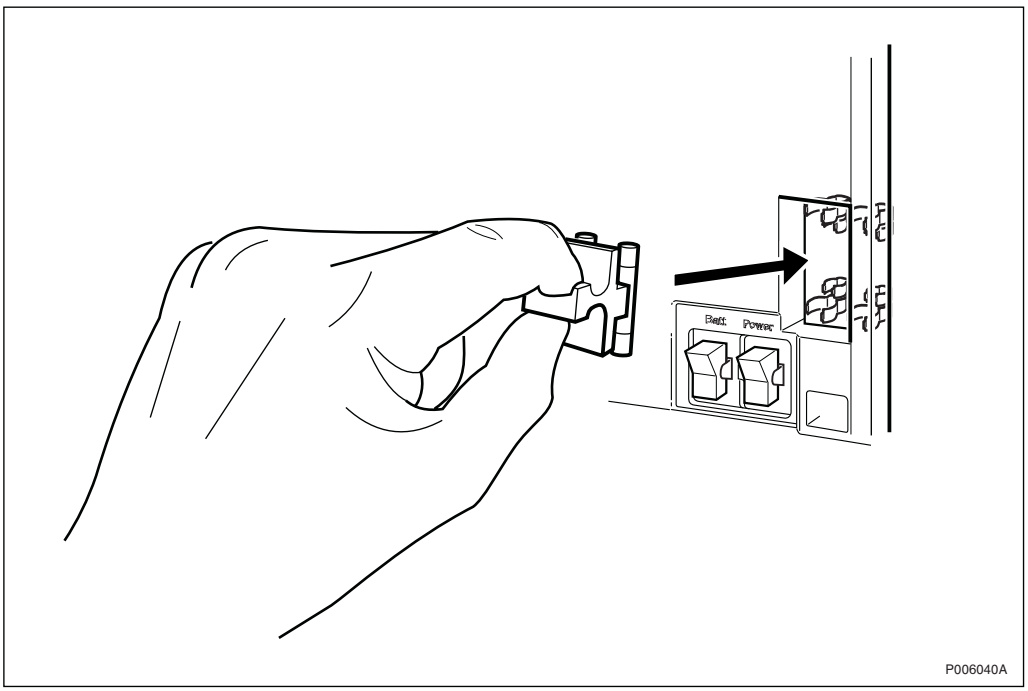

Figure 41 Snapping the fuseholder into postion

6. Snap the fuseholder into position.

5.9 Connecting Earth and Lightning Protection

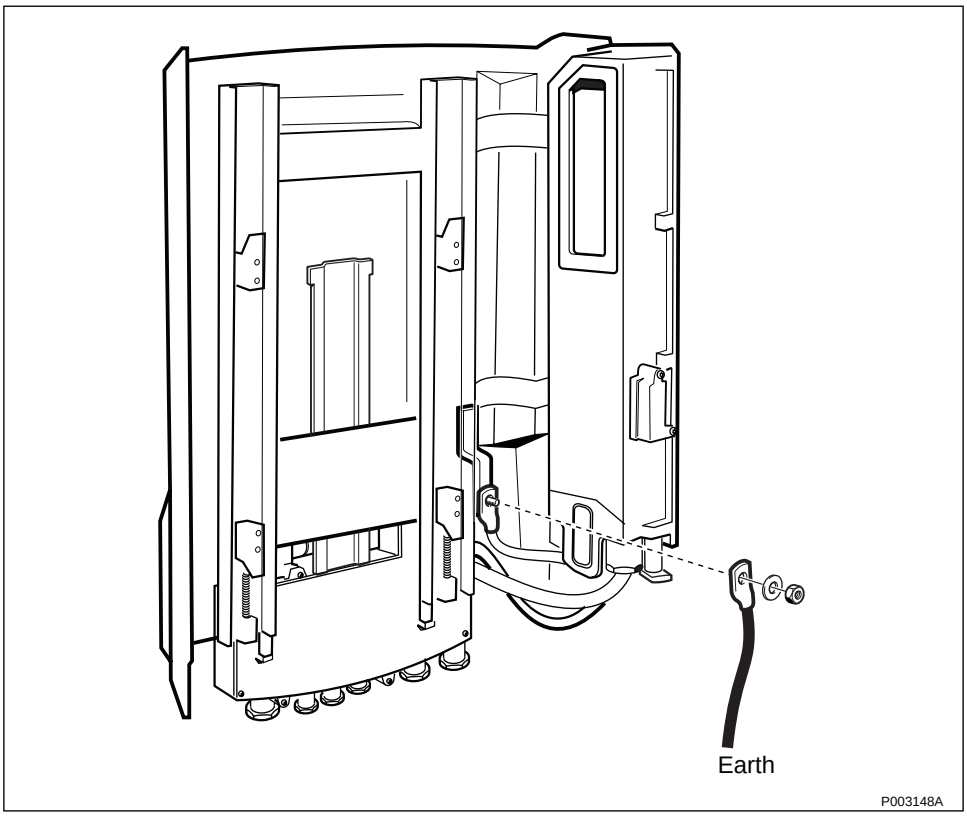

Figure 42 Connecting earth and lightning protection

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If the site is located outdoors and is not protected from lightning by a house equipped with a lightning protection system, protect the system as follows:

1. Connect the earth cable on the mounting base. Use earthing kit, see:

General Installation Instructions *LZN 302 49*

2. Connect the other end of the earth cable to the existing lightning system close to the equipment.

Note: If there is no lightning protection system, use the earthing bar, see:

General Installation Instructions *LZN 302 49*

5.10 Connecting External Cables

This section describes the connections of AC mains, PCM (Network) and the external alarm cable.

5.10.1 Opening the Interface Box

Before the connection procedure can begin the interface box has to be opened.

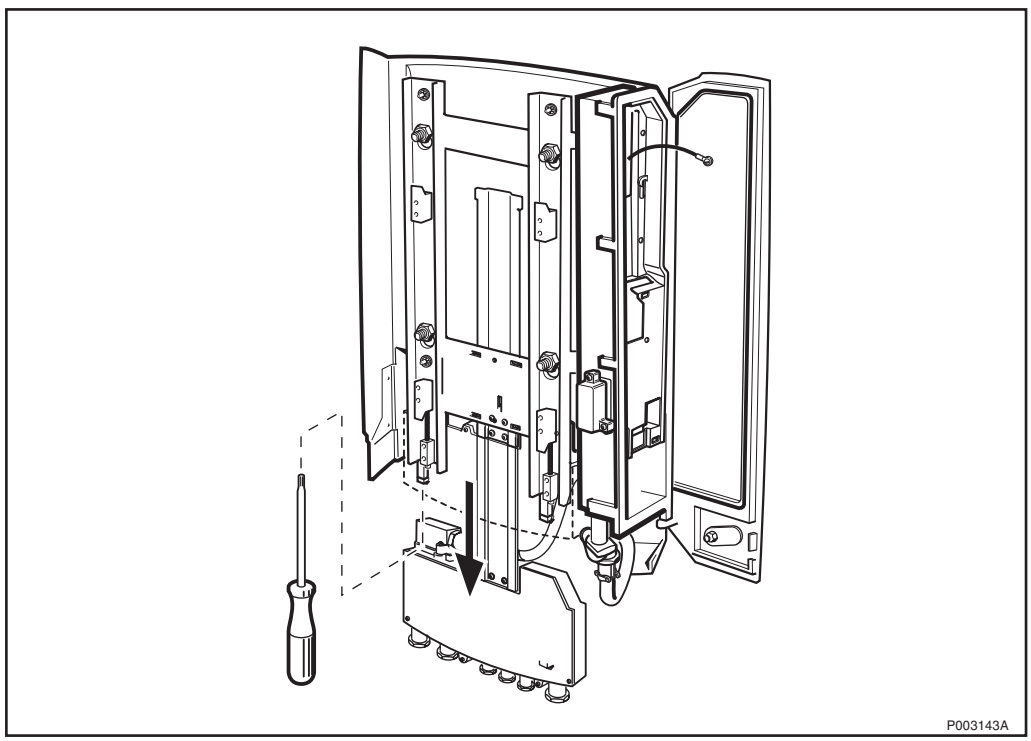

Figure 43 Pulling down the interface box

1. Loosen the screws securing the interface box placed underneath the RBS and pull down the interface box.

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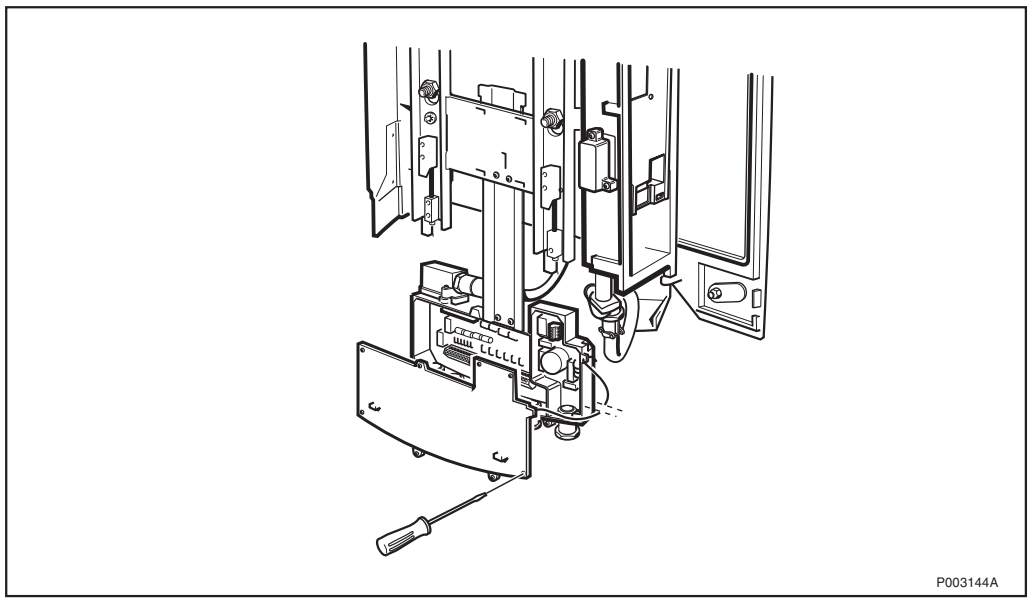

Figure 44 Opening the interface box cover

2. Unscrew the 8 torx screws on the interface box cover. Let the cover hang in the strap.

5.10.2 Connecting the AC Mains

DANGER

High voltage is used in the operation of this equippment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

DANGER

Improper electrical installation may cause fire or electrical shock. Approved circuit breakers for the AC mains and the cable's cross sectional area must always be selected in accordance with local laws and regulations. Only a qualified and authorized electrician is permitted to install and modify the electrical installation.

Protective Earth

A reliable incoming Protective Earth must be connected to the earth terminal when connecting power supply.

The earth terminal is located in the interface box, indicated by PE and the earth symbol.

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Figure 45 Protective Earth

The Protective Earth connection is essential.

Connecting AC

It is not possible to loosen the gland plate for the AC cable from the interface box. Thus the AC cable can not be mounted at ground level.

Follow the procedure below to connect the AC mains power cable.

Note: Make sure the AC Mains is switched off before beginning the AC installation procedure.

1. Route the AC mains cable so the interface box can be pushed up into the cabinet.

If a flexible conduit is to be used, replace the AC mains cable inlet (feed throught) with the flexible conduit and its fastening device, *see Figure 48 on page 83*.

2. Cut the cable to the appropriate length.

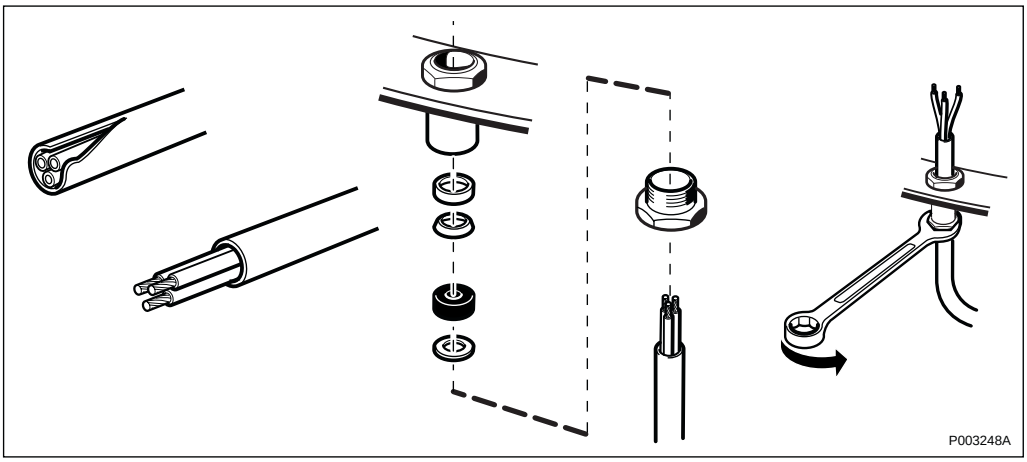

Figure 46 Dismantling and mounting the cable inlet

3. Cut the cable isolation.
4. Adjust the sealing grommet to the cable diameter.
5. Mount all cable inlet details, *see Figure 46 on page 82*.
6. Route the cable into the inlet and tighten the cable gland.

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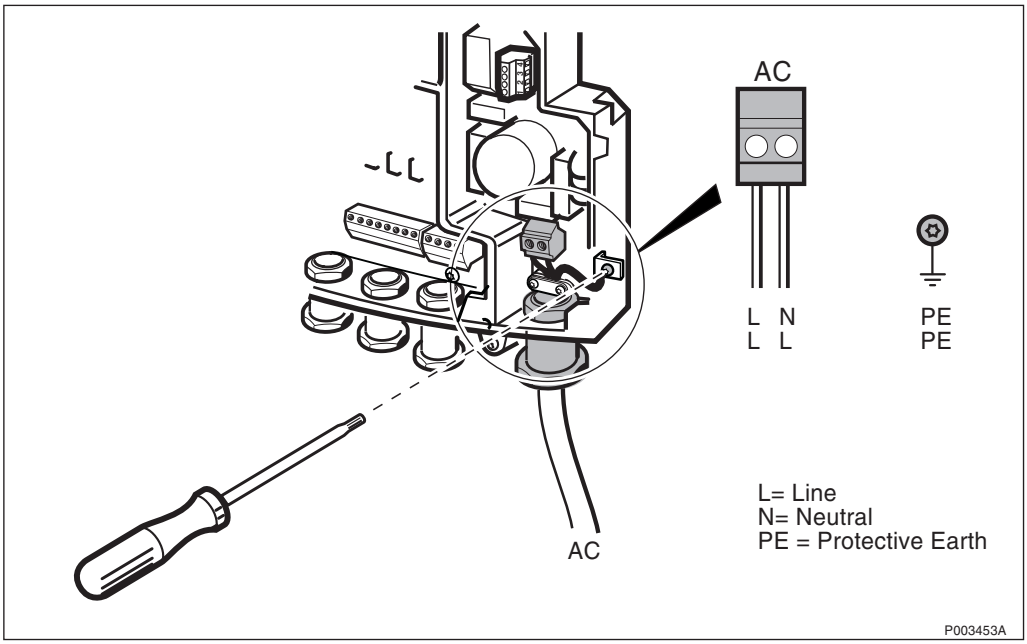

Figure 47 Connecting AC mains and protective earth

7. Connect the AC mains cable.
8. Ensure that the protective earth (PE) is properly connected.

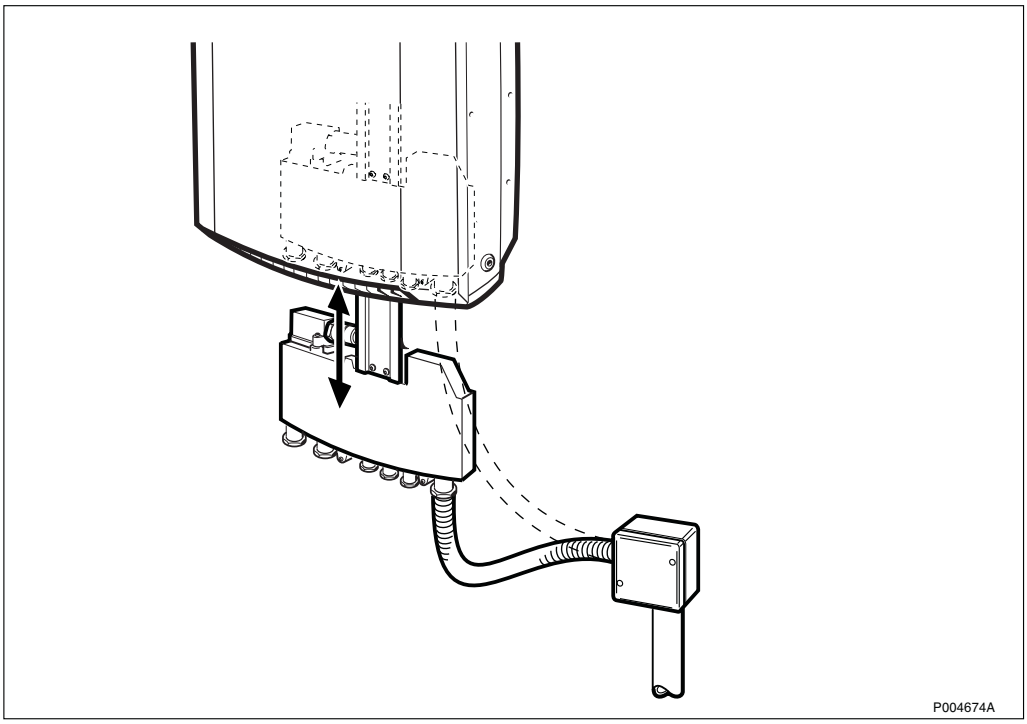

Figure 48 Example of use of flexible conduit

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5.10.3 Loosening the Interface Box Gland Plate

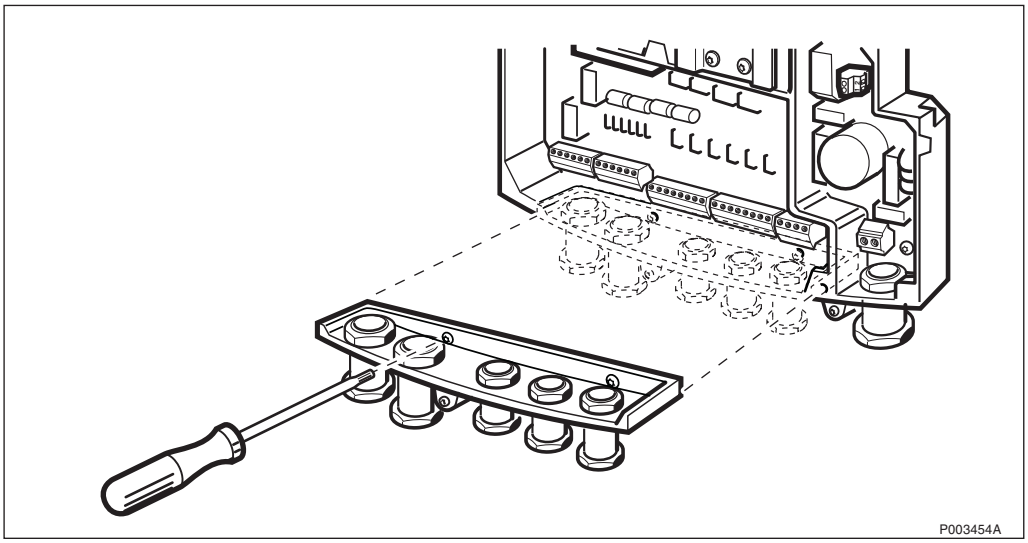

Figure 49 Loosening the gland plate

To simplify the mounting of the cables to the interface box the gland plate may be loosened. This is done by unscrewing the 2 torx screws.

For example is it easier to mount the cable inlet and the cable termination block at ground level instead of at a height, for example on a ladder.

Loosening the Termination Block

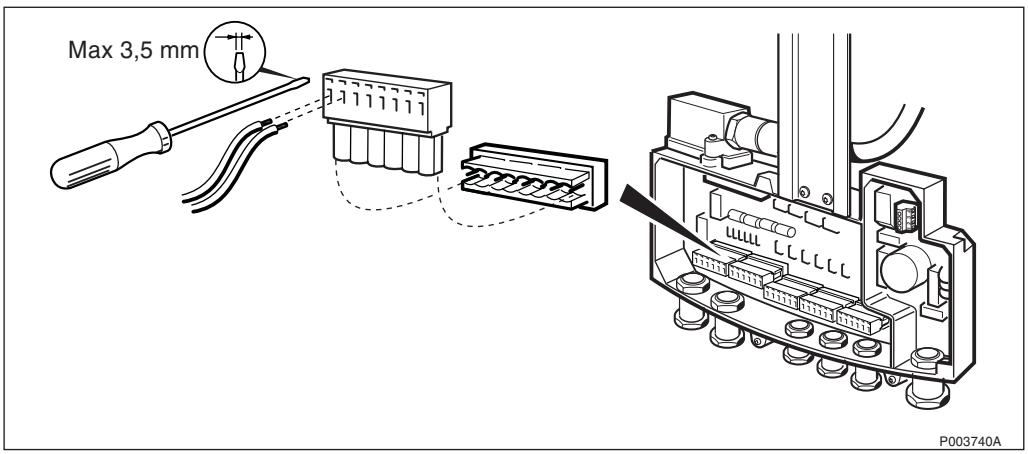

Figure 50 Loosening the termination block

The termination blocks may be loosened to simplify the mounting of the cables.

5.10.4 Assembling and Earthing of a twisted pair cable

This section describes the assembling and mounting of a twisted pair cable that is to be connected to the interface box. Also different ways to earth the cable is presented.

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Assembling the Cable Gland

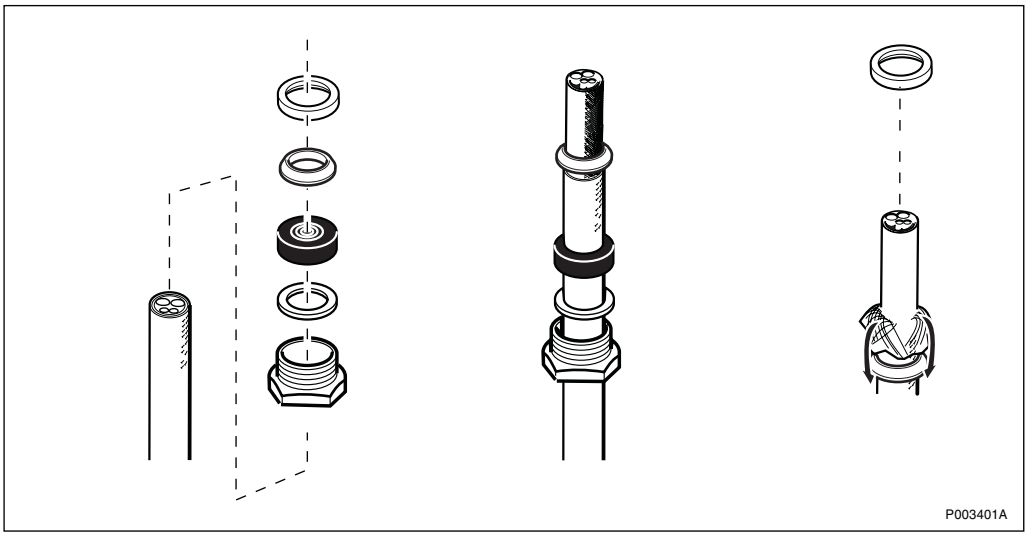

Figure 51 Assembling the cable gland

1. Cut the cable to appropriate length.

Note: Remember to take into account that extra cable length is required so that the interface box can be mounted back into position in the mounting base.

2. Route the cable so the interface box can be pushed up.
3. Adjust the sealing grommet to the cable diameter.
4. Mount all cable gland details, except for the last clamping cone.
5. Remove the insulation.

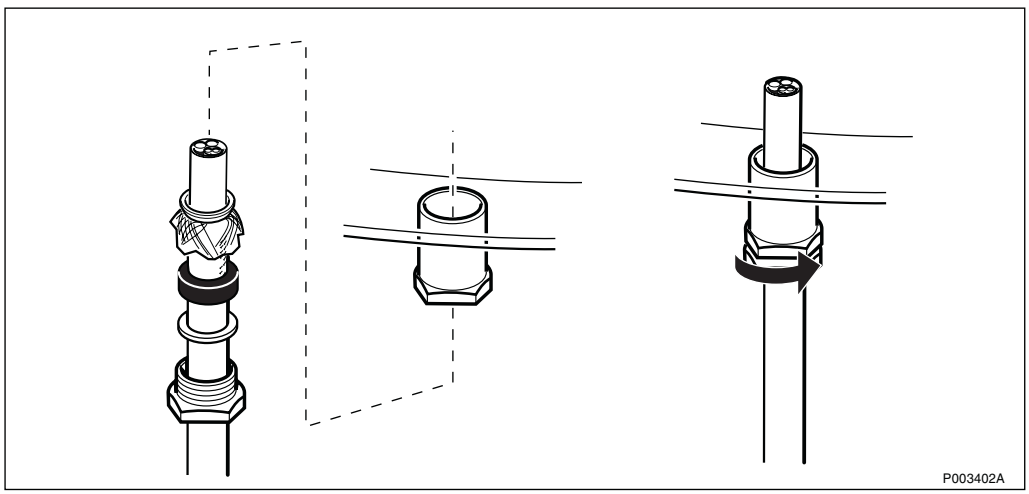

Figure 52 Mounting the cable gland

6. Fold the outer braid.
7. To earth the cable, fit the clamping cone over the cable so that the outer cable braid is squeezed between clamping ring and clamping cone.

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8. Route the cable into the inlet and tighten the cable gland.

Earthing the twisted pair cable

Depending on the cable, there are several ways to earth a twisted pair cable. The principle is that it is most satisfying to make the earth connection as near as possible to the cable gland. The table below shows how to earth the cable in different cases.

Table 7 Eathing options for twisted pair cable

Type of cable	Earthing point
Inner and outer shield.	Inner shield to the pull relief clamp and the outer shield to the cable gland, see *Figure 53 on page 86.* alternative Inner shield to the termination block and the outer shield to the cable gland, see *Figure 54 on page 87.*
Inner shield only.	Shield to the pull relief clamp, see *Figure 55 on page 87.*
Outer shield only.	Shield to the cable gland, see *Figure 56 on page 88.*

The figures below show the corresponding connections.

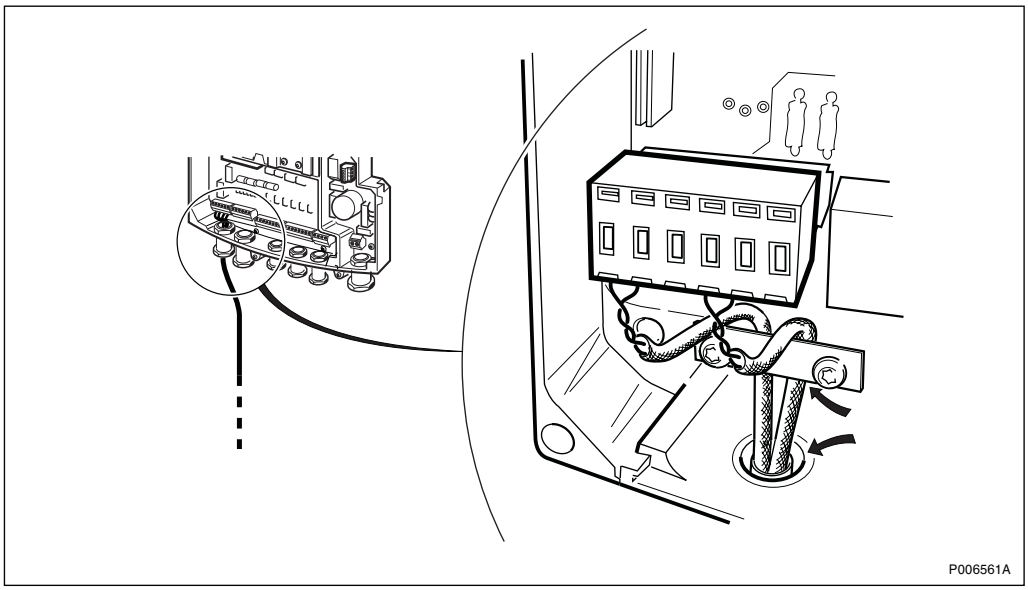

Figure 53 Inner and outer shield, earthing via the pull relief clamp and the cable gland

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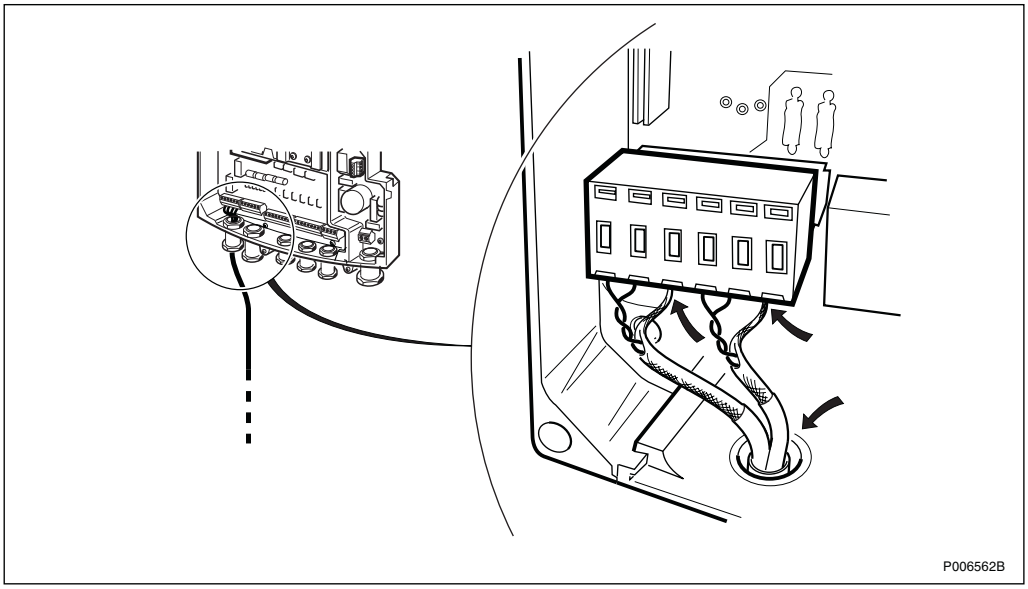

Figure 54 Inner and outer shield, alternative, earthing via the termination block and the cable gland

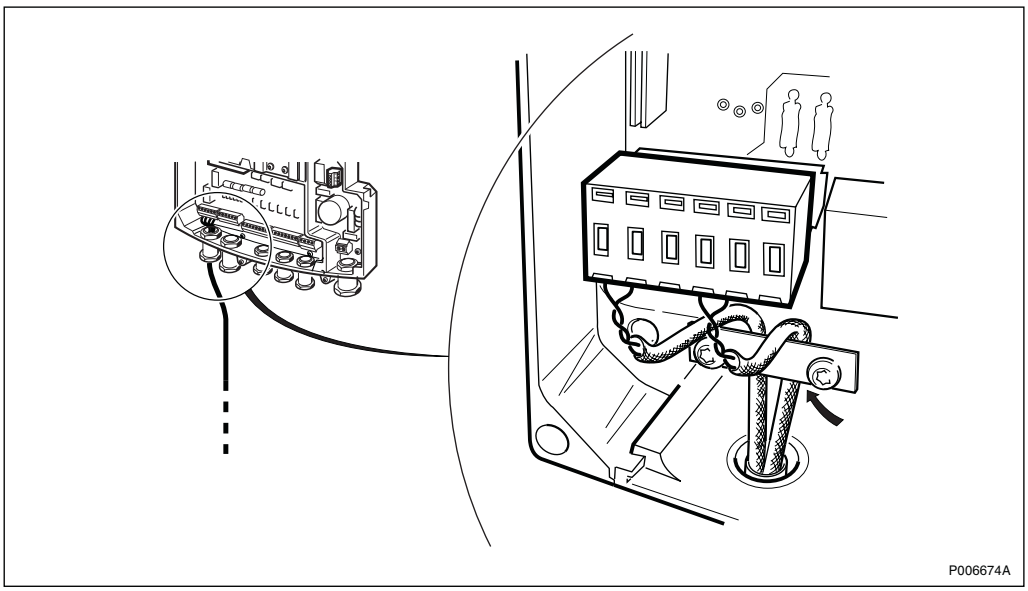

Figure 55 Inner shield only, earthing via the pull relief clamp

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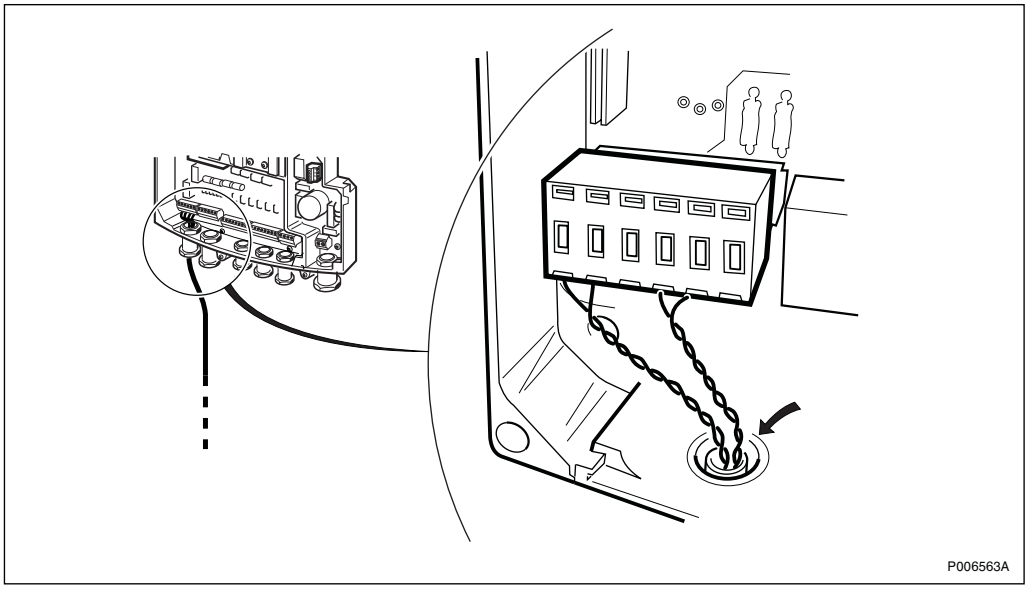

Figure 56 Outer shield only, earthing via the cable gland

5.10.5 Connecting the PCM cable

Different types of cables can be used for the PCM transmission, depending on the transmission to the RBS. These cables are presented below.

- The pre–assembled 75 Ω coaxial cable with DC isolation that can be ordered as an option for 75 Ω transmission.
- It is possible to use an ordinary 75 Ω coaxial cable to assemble a cable with the same function as the pre-assembled. It is also possible to assemble a cable without the DC isolation function, but otherwise with the same function as the pre-assembled. How to assemble these cables is described in *Section Assembling the PCM coaxial 75 Ω cable on page 88*.
- The twisted pair cable used for 100/120 Ω transmission. *See Section 5.10.4 on page 84* for assembling and earthing the twisted pair cable.

Assembling the PCM coaxial 75 Ω cable

It is possible to assemble a cable with the same characteristics as the premounted. If the DC isolation is not required it is also possible to assemble a cable without this feature.

How to assemble these cable are presented below.

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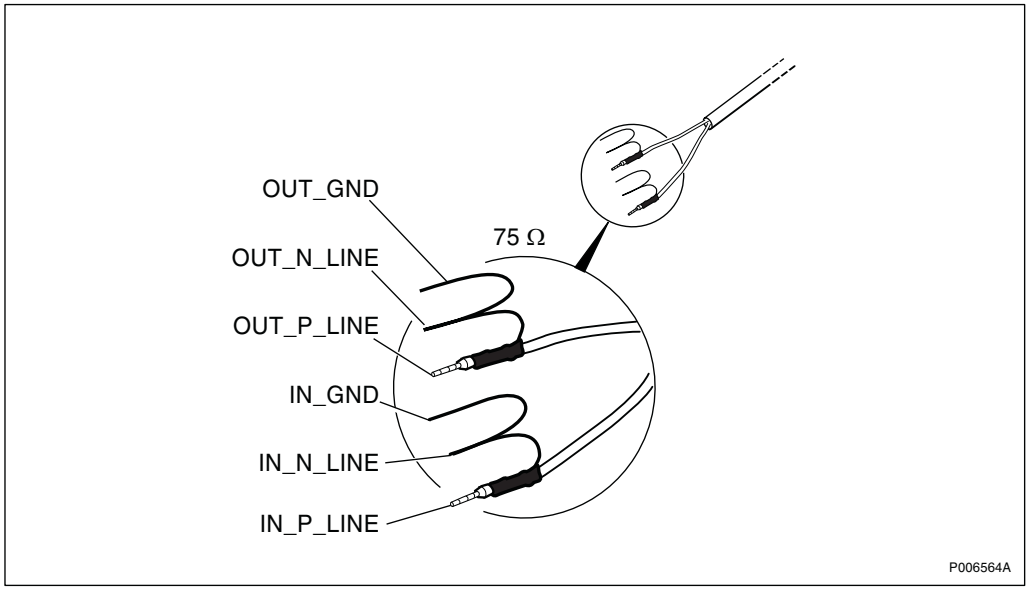

Figure 57 Alternative 75 Ω PCM cable if DC isolation is not required

If the DC isolation is not required a 75 Ω cable can be assembled by using an ordinary coaxial cable, see figure above.

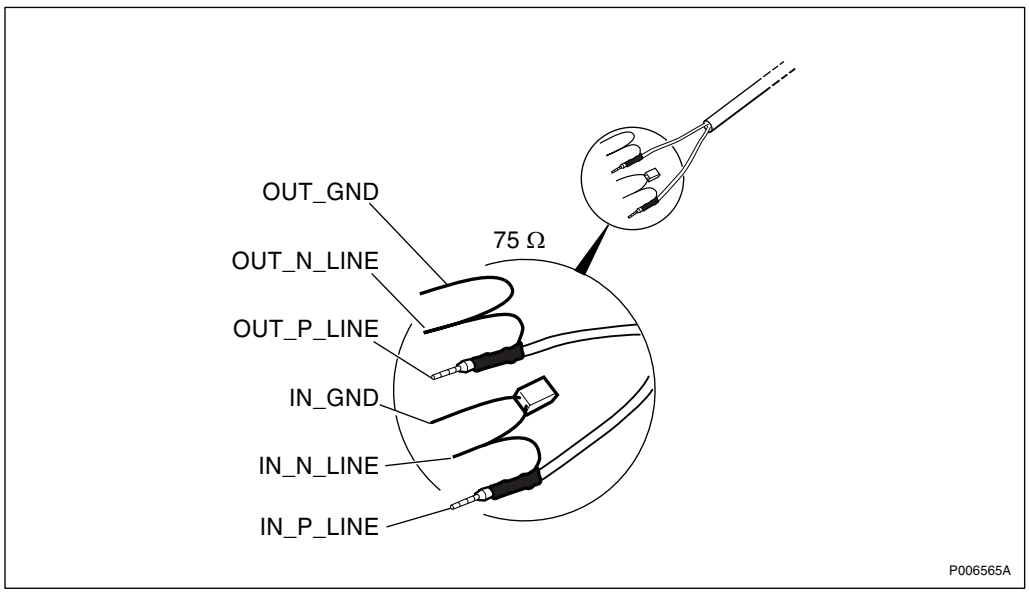

Figure 58 Alternative 75 Ω PCM cable if DC isolation is required

If the DC isolation is required a 75 Ω cable can be assembled by using an ordinary coaxial cable with a 33 nF (voltage tolerance: 400 V) capacitor mounted between IN_N_LINE and IN_GND, see figure above.

Connecting the PCM A coaxial 75 Ω cable

The connection cable for 75 Ω coaxial cable (RPM 518 974/2) with DC isolation can be ordered as an option. The cable inlet is premounted so the only installation is to connect the termination block.

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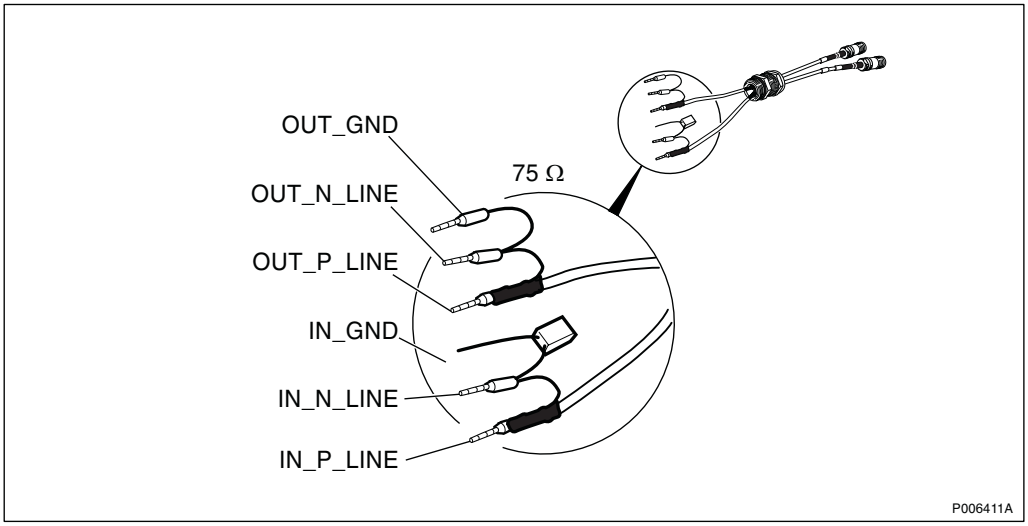

Figure 59 The 75 Ω PCM cable with DC isolation of IN wire, and coaxial TNC connectors

1. Remove the existing cable gland from the gland plate.

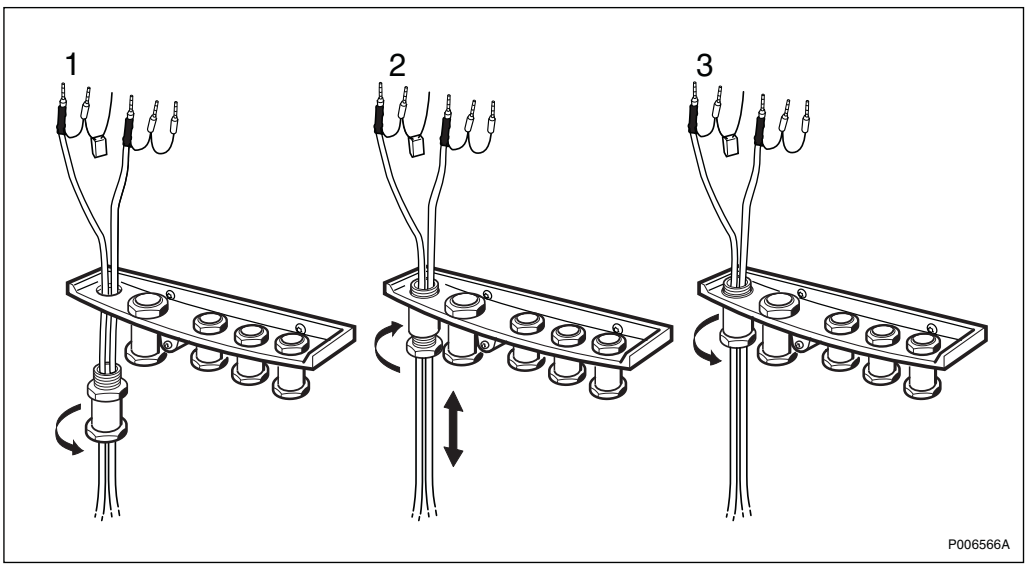

Figure 60 Mounting the cable gland with the optional 75 Ω PCM cable in the gland plate

2. Run the cable through the inlet on the cable gland plate.
3. Mount the cable gland on the gland plate and tighten the upper nut.
4. Loosen the lower cable gland sealing nut a few turns so it is possible to adjust the cable length.

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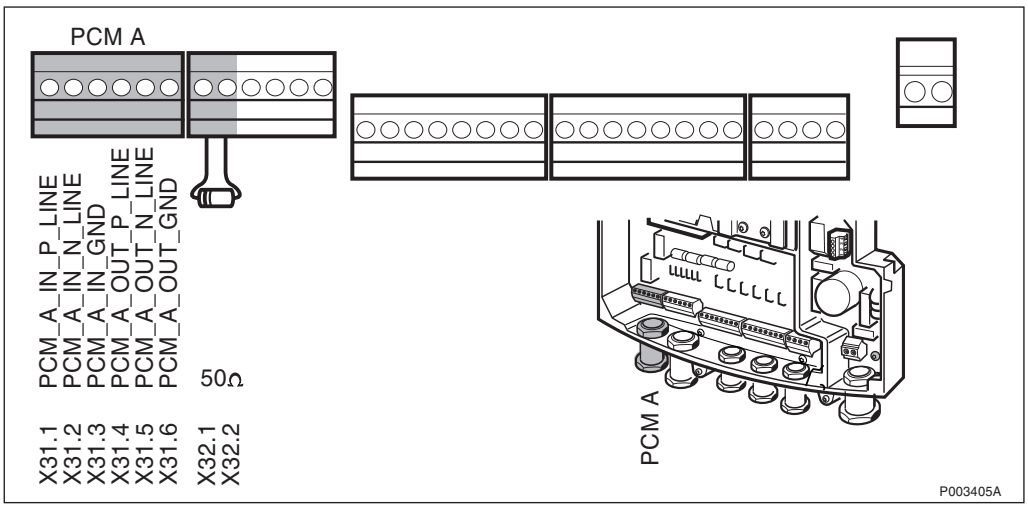

Figure 61 Connecting the 75 Ω PCM cable to the termination block

5. Connect the cables to the termination block according to the figure above.

Note: If not using a cascade connection, the premounted 50 Ω resistance between X32.1 and X32.2 on the PCM-B termination block should not be removed.

6. Remount the cable gland plate and tighten the 2 torx screws.
7. Adjust the cable to the appropiate length.

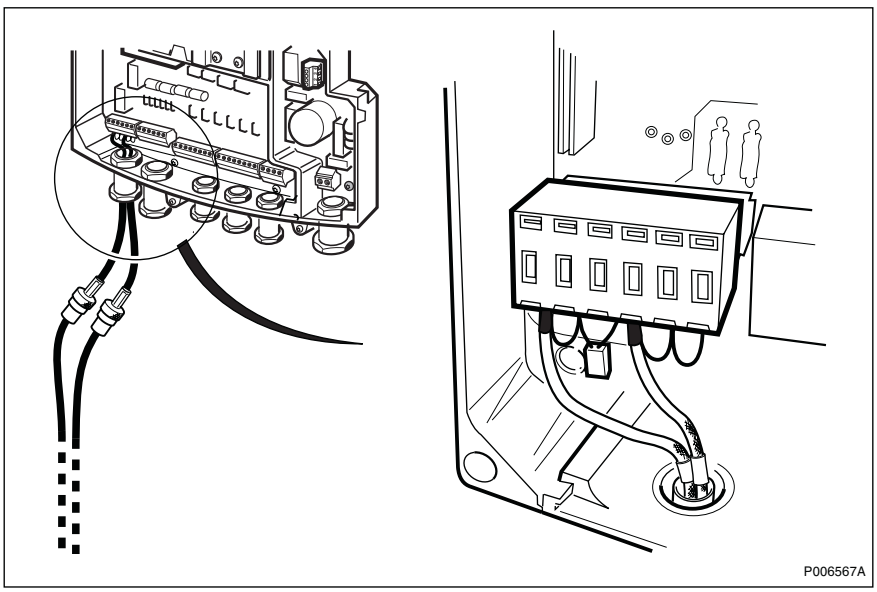

Figure 62 Principle of connecting coaxial PCM cable

8. Connect the termination block to the plinth.
9. Tighten the lower cable gland sealing nut.

Connecting the PCM A 100/120 Ω cable

The following section describes the procedure for connecting the PCM A twisted pair cable.

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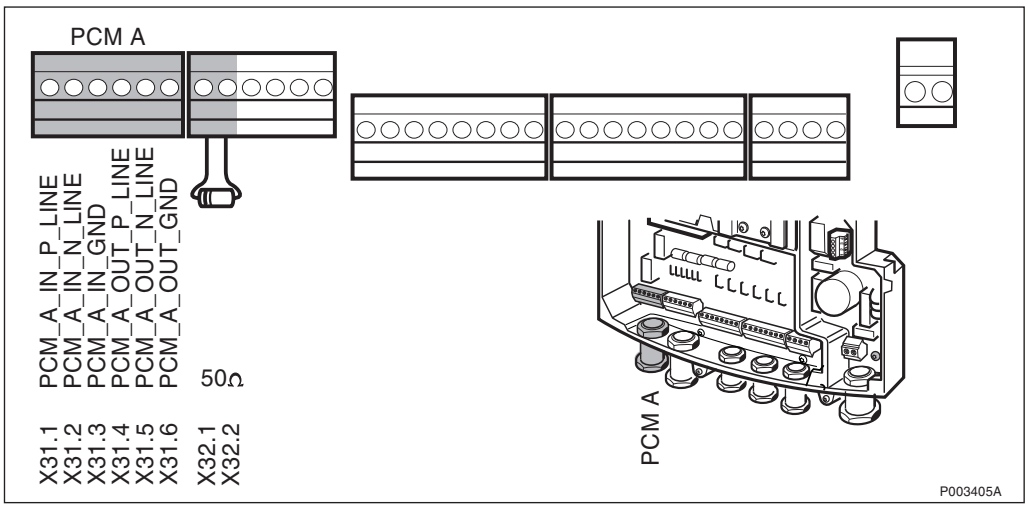

Figure 63 Connecting PCM- A cable 100/120 Ω

Note: If not using a cascade connection, the premounted 50 Ω resistance between X32.1 and X32.2 on the PCM-B termination block should not be removed.

1. If jumper wires are preinstalled beteween X31.2 and X31.3 **and** X31.5 and X31.6 respectively, remove them.
2. Connect the PCM-A 100/120 Ω cable, (twisted pair).
3. Earth the cable in one of the ways that are described in *page 86*.

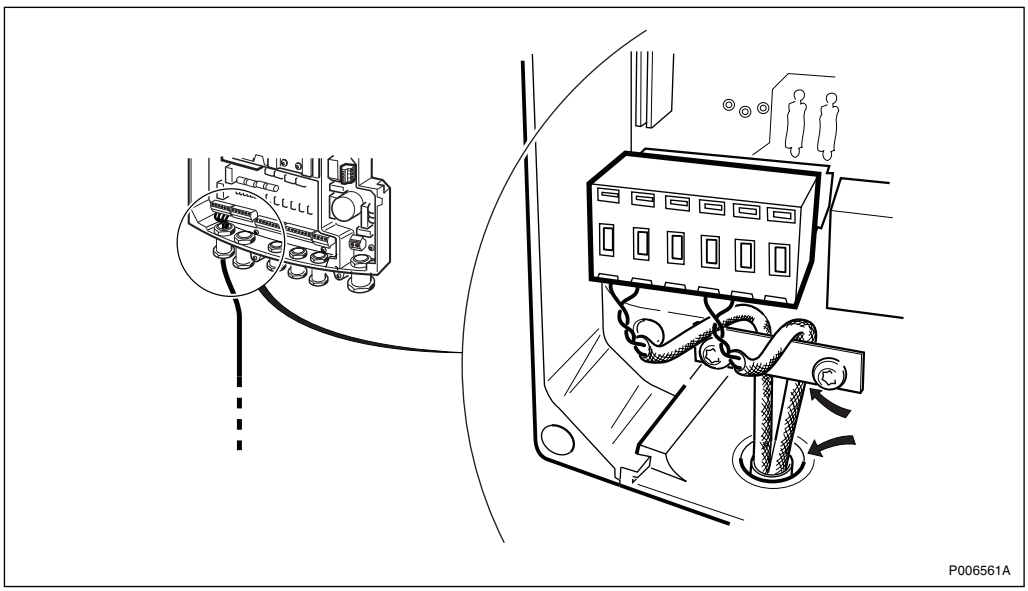

Figure 64 The cable connected to the termination block. Earthing via the cable gland and the pull relief clamp.

Connecting the PCM B coaxial 75 Ω cable (Cascade Connection)

The connection cable for 75 Ω coaxial cable (RPM 518 974/2) can be ordered as an option. The cable inlet is premounted so the only installation is to connect the termination block.

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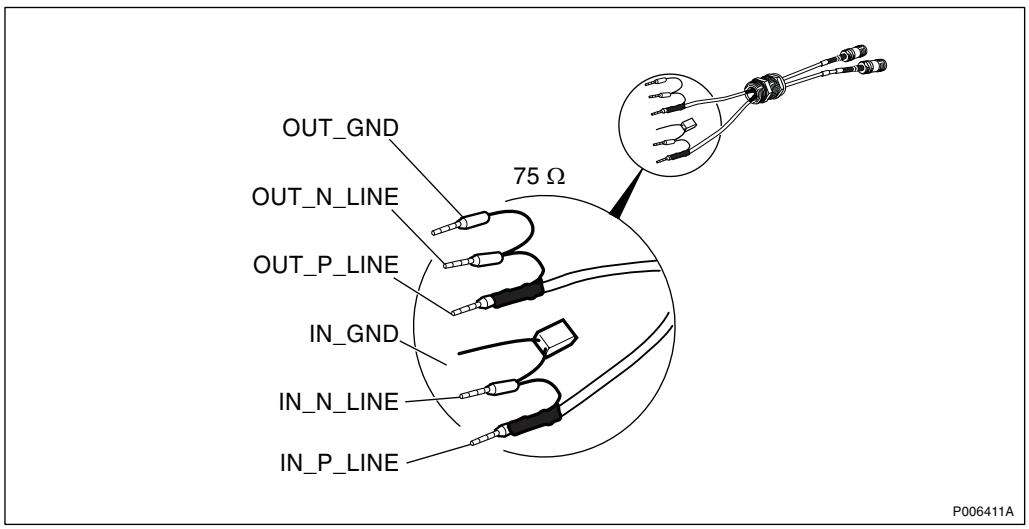

Figure 65 The 75 Ω PCM cable with DC isolation of IN wire, and coaxial TNC connectors

1. Remove the 50 Ω termination resistor from the PCM B temination block.

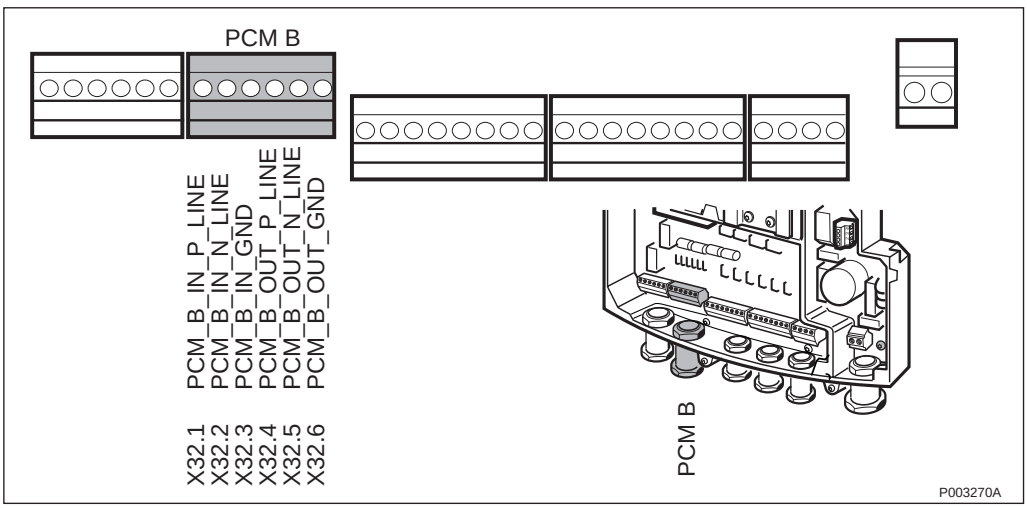

Figure 66 Connecting the 75 Ω PCM cable to the termination block (Cascade connection)

2. Follow the procedure for the PCM A cable in *Section Connecting the PCM A coaxial 75 Ω cable on page 89*to connect the PCM B cable. When connecting the cables to the PCM B termination block, refer to the figure above.

Connecting the PCM B 100/120 Ω cable (Cascade Connection)

The following section describes the procedure for connecting the PCM B twisted pair cable, used for cascade connection of up to five RBSs.

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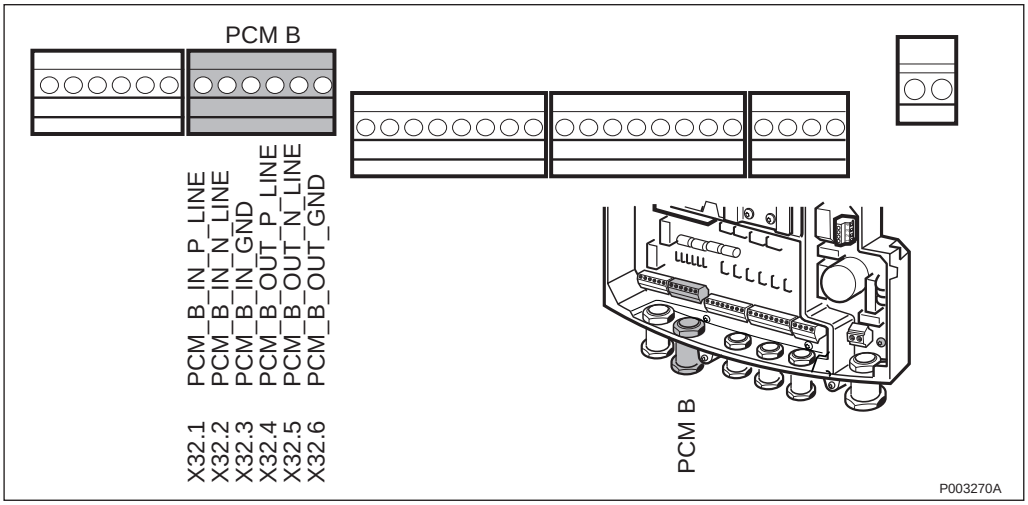

Figure 67 Connecting the PCM-B cable 100/120 Ω

1. Remove the premounted 50 Ω resistance between X32.1 and X32.2 on the PCM-B termination block.
2. If jumper wires are preinstalled beteween X32.2 and X32.3 **and** X32.5 and X32.6 respectively, remove them.
3. Connect the PCM-B 100/120 Ω cable, (twisted pair).
4. Earth the cable in one of the ways that are described on *page 86*.

Compare with *Figure 64 on page 92* which show the corresponding connections for the PCM-A termination block.

5. Connect the PCM-B cable to the next cabinet. Connections according to *Section Cascade Connection, Connection between the Cabinets on page 94*.

Cascade Connection, Connection between the Cabinets

This section deals with the connection between the cabinets when cascade connection is used.

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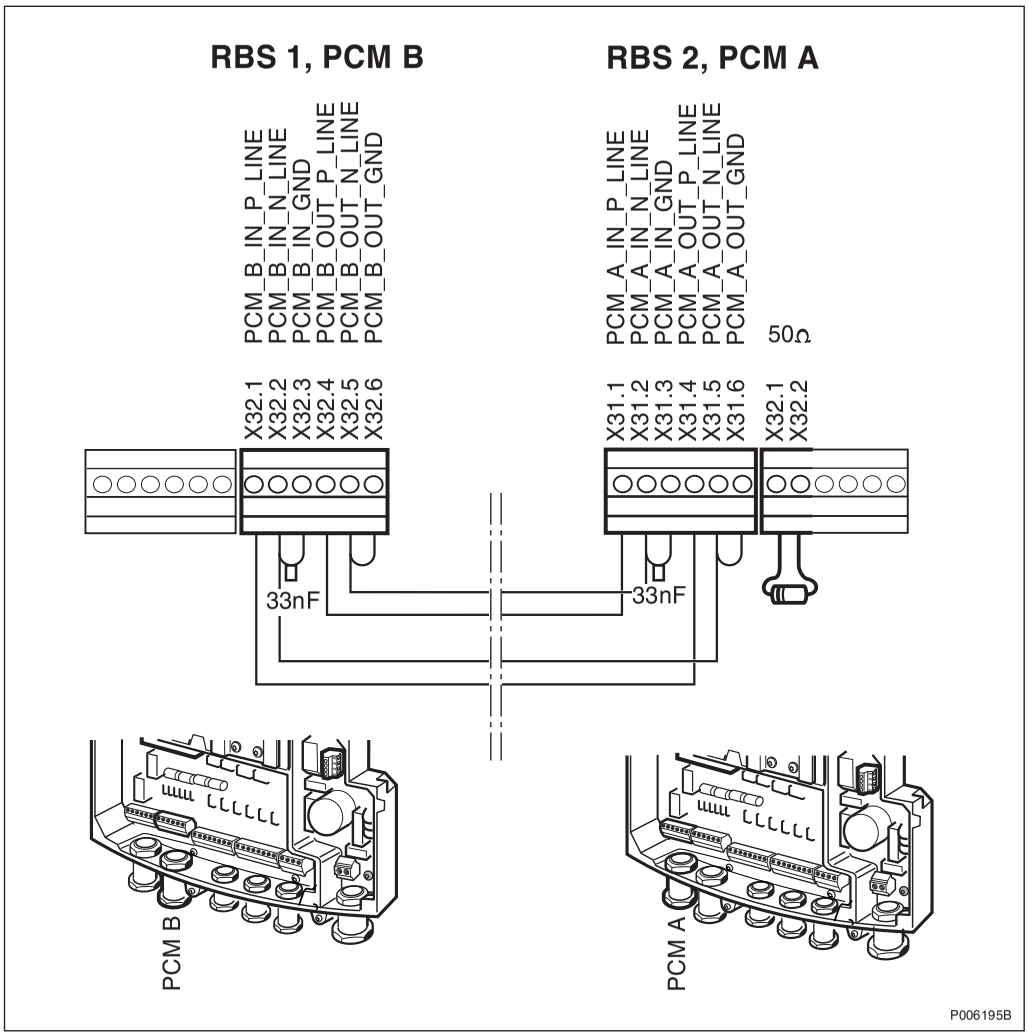

Figure 68 Connection between RBS 1 and RBS 2, cascade connection, 75 Ω coaxial cable

The figure above shows the connection for the transmission between RBS 1 and RBS 2 (cascade connection) for 75 Ω coaxial cable.

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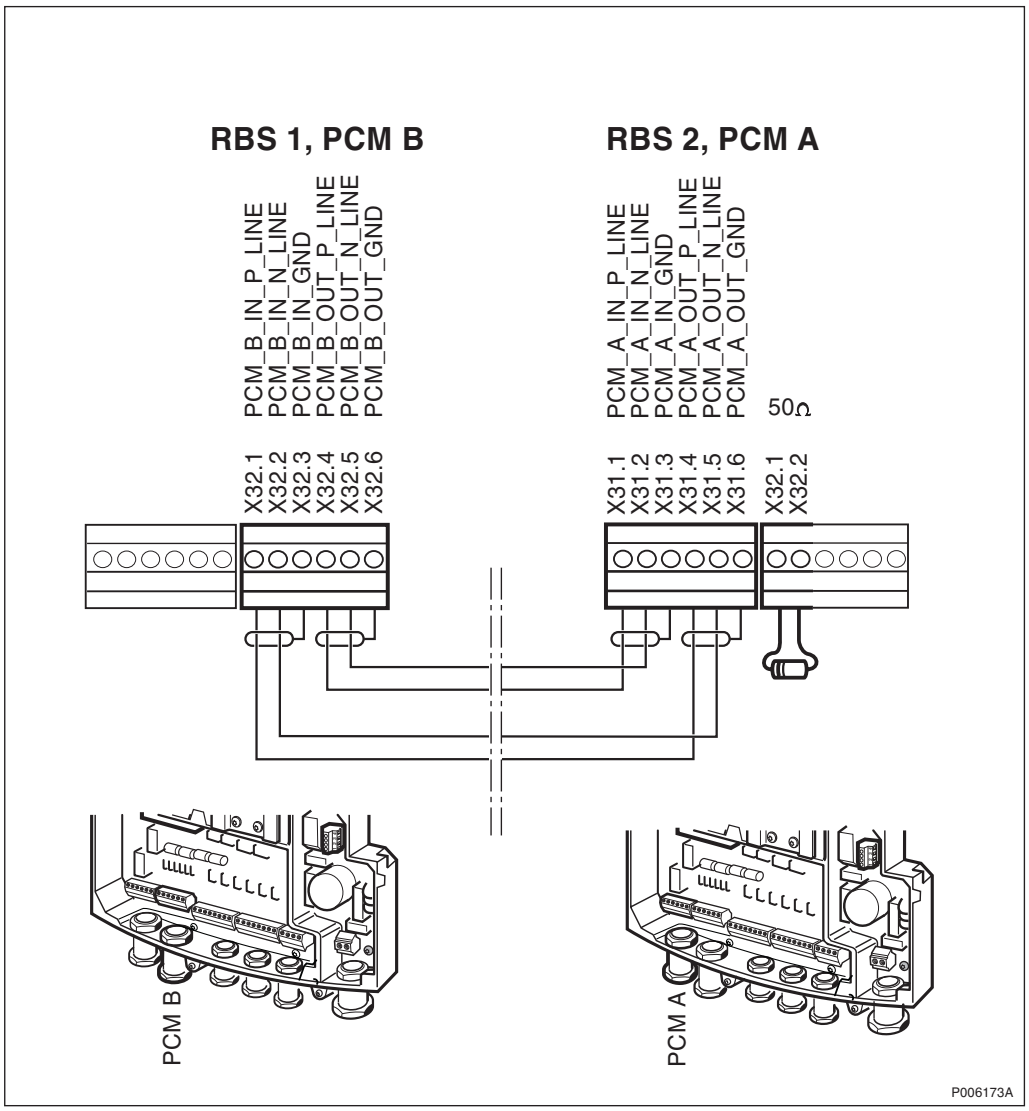

Figure 69 Connection between RBS 1 and RBS 2, cascade connection, 100/120 Ω twisted pair cable

The figure above shows the connection for the transmission between RBS 1 and RBS 2 (cascade connection) for 100/120 Ω twisted pair cable. See *page 86* for earthing options.

Connecting the PCM cable (coaxial) to the incoming PCM line

1. Connect the PCM cable connector, type TNC, to the incoming PCM line.

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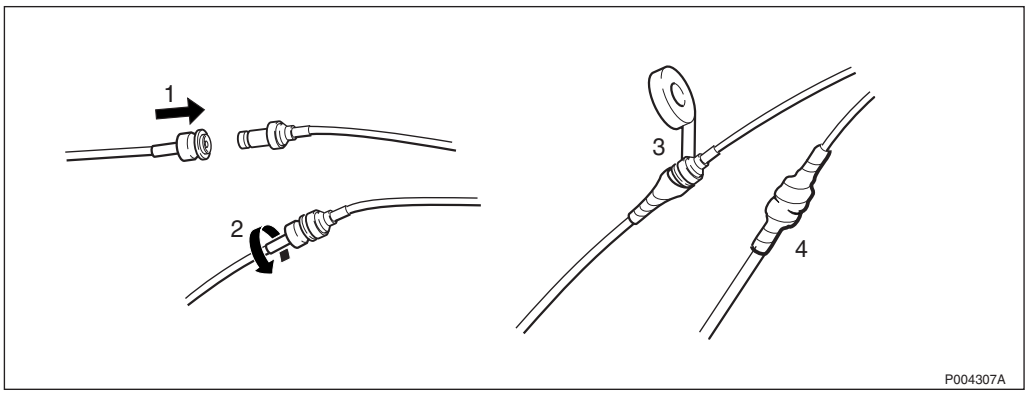

Figure 70 Connecting and sealing the TNC connector for the PCM 75 Ω cable

2. Seal the connector.

Information about the sealing procedure can be found in.

General Installation Instructions *LZN 302 49*

5.10.6 HDSL transmission module Installation (optional)

For more information regarding the mounting of the HDSL modem *see Section 5.7 on page 75*.

Definitions

Upstream	Connection from BSC or previous RBS
Downstream	Connection to next RBS

Connections to the Interface Box of the RBS 2302

Due to the configuration of the HDSL-modem, *see chapter Site Installation Tests*, the connections to the interface box to the RBS 2302 described in the following sections are possible.

The details about the physical installation and the grounding procedure for the cables are described in *Section 5.10.4 on page 84.*

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HDSL Upstream, One Pair

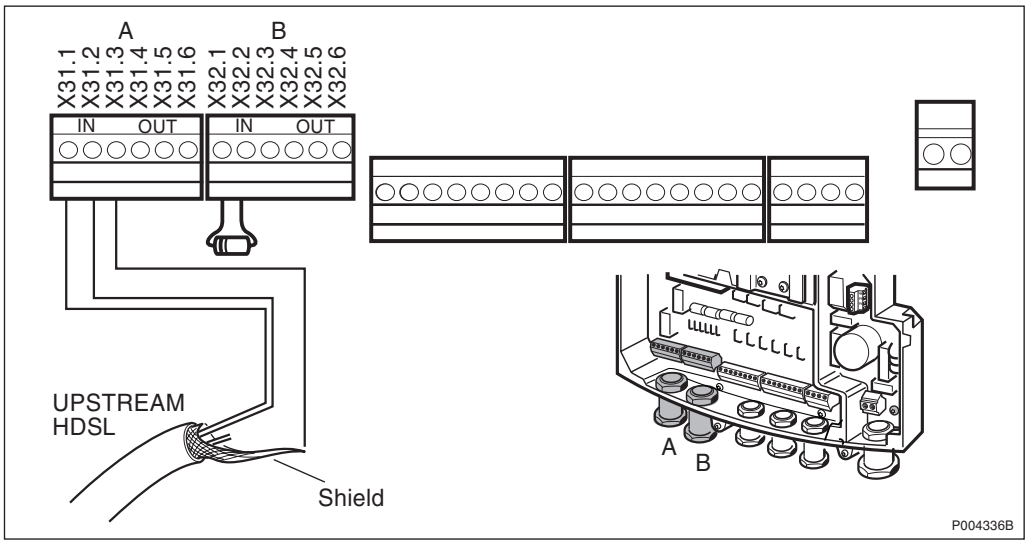

Figure 71

The pair is connected to the PCM-A IN, i.e. X31.1 and X31.2.

Shield, if available, is connected to the pull relief clamp or to X31.3 (ground connection). See *page 86* for earthing options.

HDSL Upstream, Two Pairs

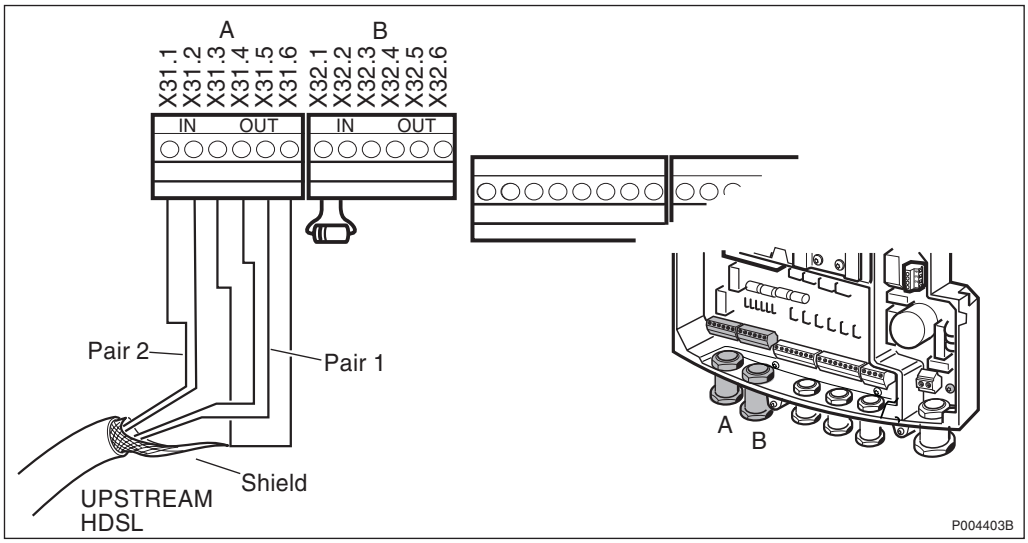

Figure 72

One pair is connected to the PCM-A IN, i.e. X31.1 and X31.2.

One pair is connected to the PCM-A OUT, i.e. X 31.4 and X31.5.

Shield, if available, is connected to the pull relief clamp or to X31.3 and X31.6 respectively (ground connections). See *page 86*for earthing options.

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HDSL Upstream, One pair, PCM Downstream

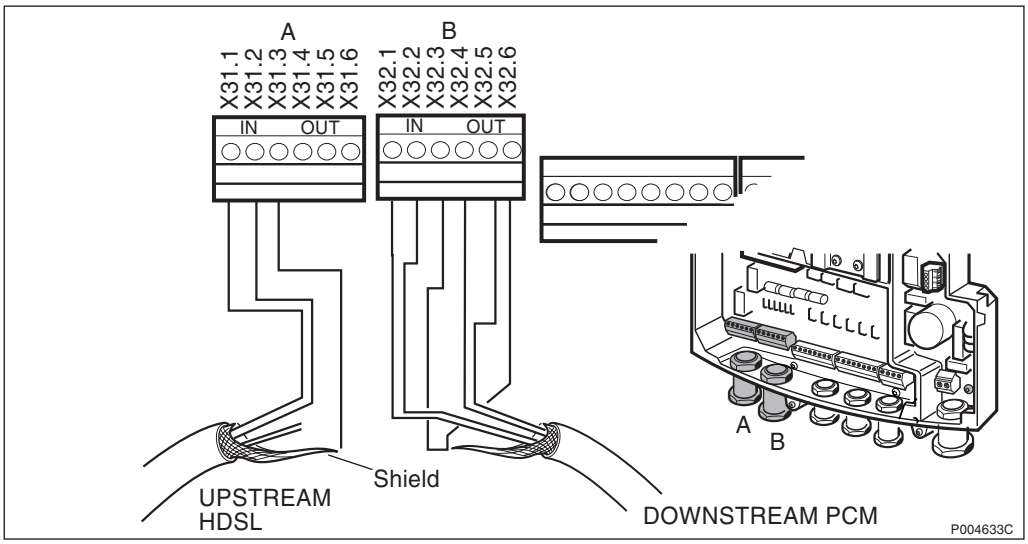

Figure 73

One HDSL-pair is connected to the PCM-A IN, i.e. X31.1 and X31.2.

Shield, if available, is connected to the pull relief clamp or to X31.3 and X31.6 (ground connections). See *page 86*for earthing options.

HDSL Upstream, Two Pairs, PCM Downstream

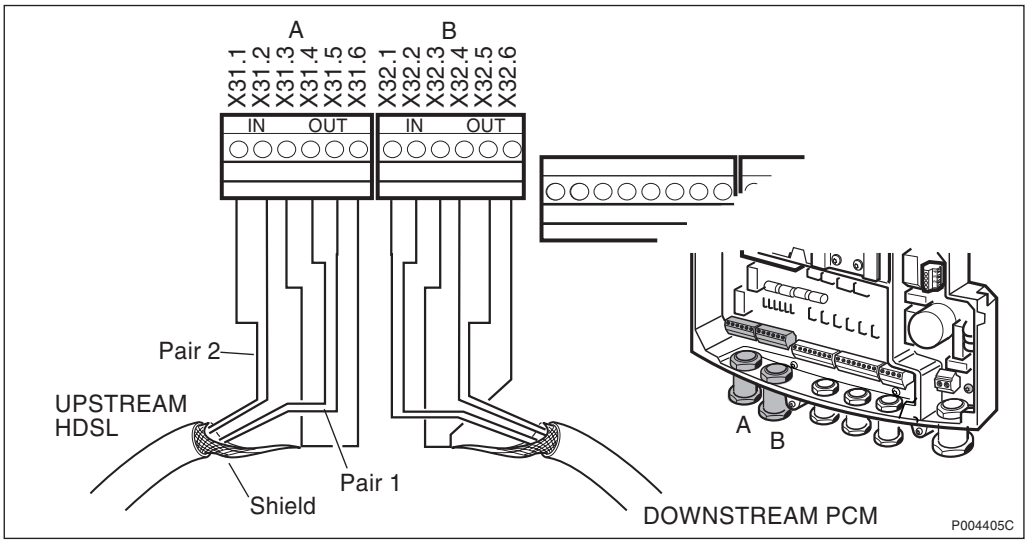

Figure 74

One HDSL-pair is connected to the PCM-A IN, i.e. X31.1 and X31.2.

One HDSL-pair is connected to the PCM-A OUT, i.e. X31.4 and X31.5.

Shield, if available, is connected to the pull relief clamp or to X31.3 and X31.6 (ground connections). See *page 86*for earthing options.

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HDSL Cascading (Upstream One Pair, Downstream One Pair)

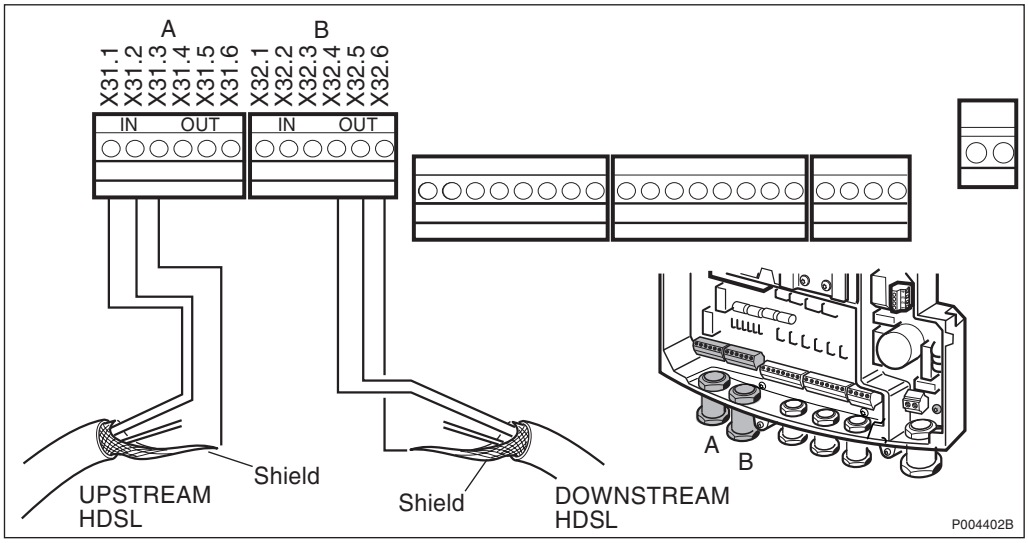

Figure 75

Upstream pair is connected to the PCM-A IN, i.e. X31.1 and X31.2.

Shield, if available, is connected to X31.3 (ground connection).

Downstream pair is connected to the PCM-B OUT, i.e. X32.4 and X32.5.

Shield, if available, is connected to the pull relief clamp or to X32.6 (ground connection). See *page 86* for earthing options.

PCM Upstream, HDSL Downstream, One Pair

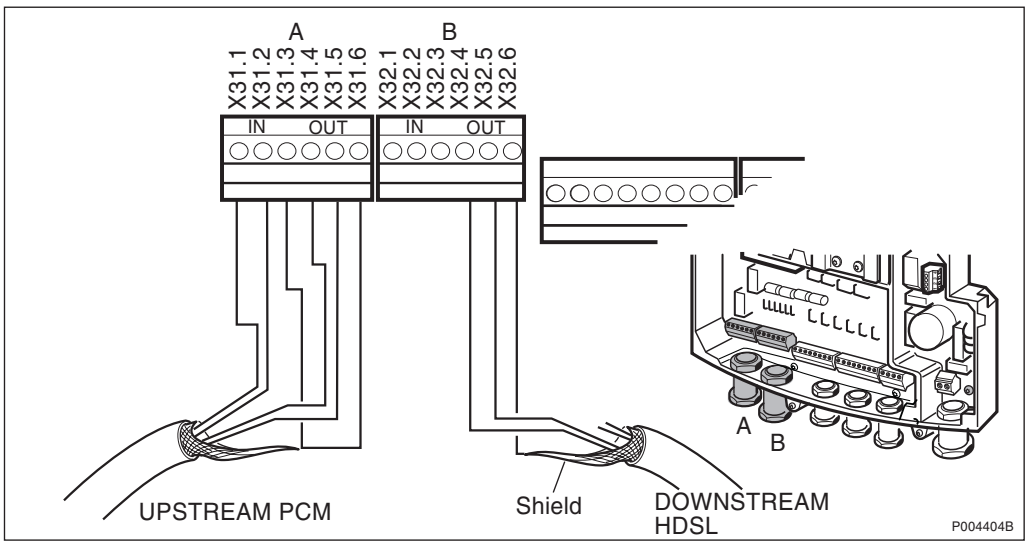

Figure 76

The HDSL-pair is connected to the PCM-B OUT, i.e. X32.4 and X32.5.

Shield, if available, is connected to the pull relief clamp or to X32.6 (ground connection). See *page 86* for earthing options.

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PCM Upstream, HDSL Downstream, Two Pairs

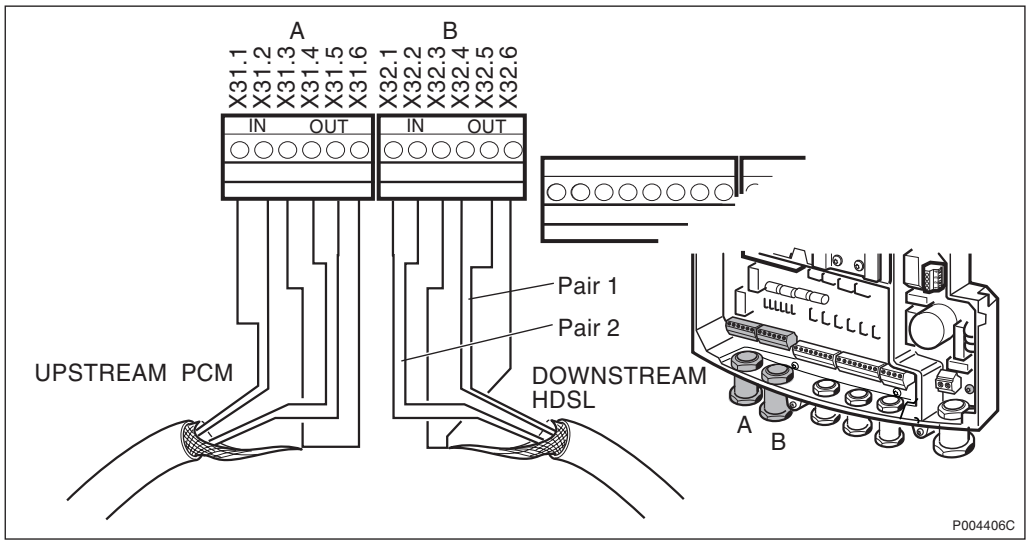

Figure 77

One HDSL-pair is connected to the PCM-B IN, i.e. X32.1 and X32.2.

One HDSL-pair is connected to the PCM-B OUT, i.e. X32.4 and X32.5.

Shield, if available, is connected to the pull relief clamp or to X32.3 and X32.6 (ground connections). See *page 86*for earthing options.

External Alarms of the RBS 2302 used by the HDSL Modem Modul

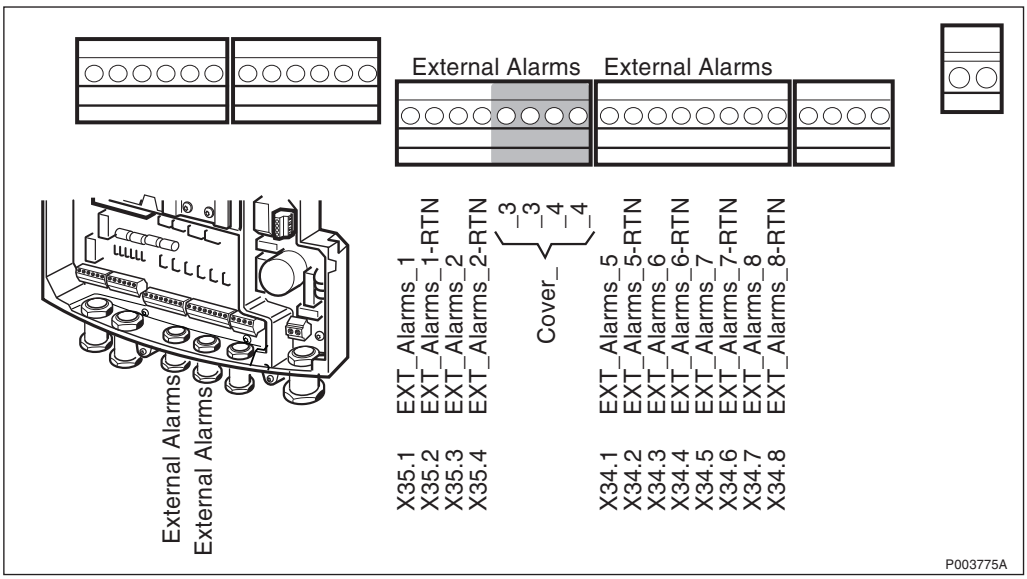

Figure 78 Covering of External Alarms

If the HDSL modem uses the RBS 2302 external alarms the number of customer available external alarms will be reduced by two.

1. If in use, disconnect the external alarms number 3 and 4.
2. Place a cover label to the termination block, position 3 and 4 to prevent other usage for these external alarms.

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5.10.7 Connecting the External– and PBC Alarm Cables

The RBS 2302 has eight external alarm inputs. Four of the eight alarm inputs are reserved for the optional PBC. The alarm inputs are numbered from 1 to 8 on the RBS transmission board and it is up to the installation engineer to decide which inputs to use since they are defined in the IDB with the OMT. It is recommended to be consistent and use the same inputs for the PBC alarms for example 5 to 8 to simplify the installation and maintenance procedure.

1. Dismantle the Alarm cable and mount the cable inlet, *see Section 5.10.4 on page 84*.

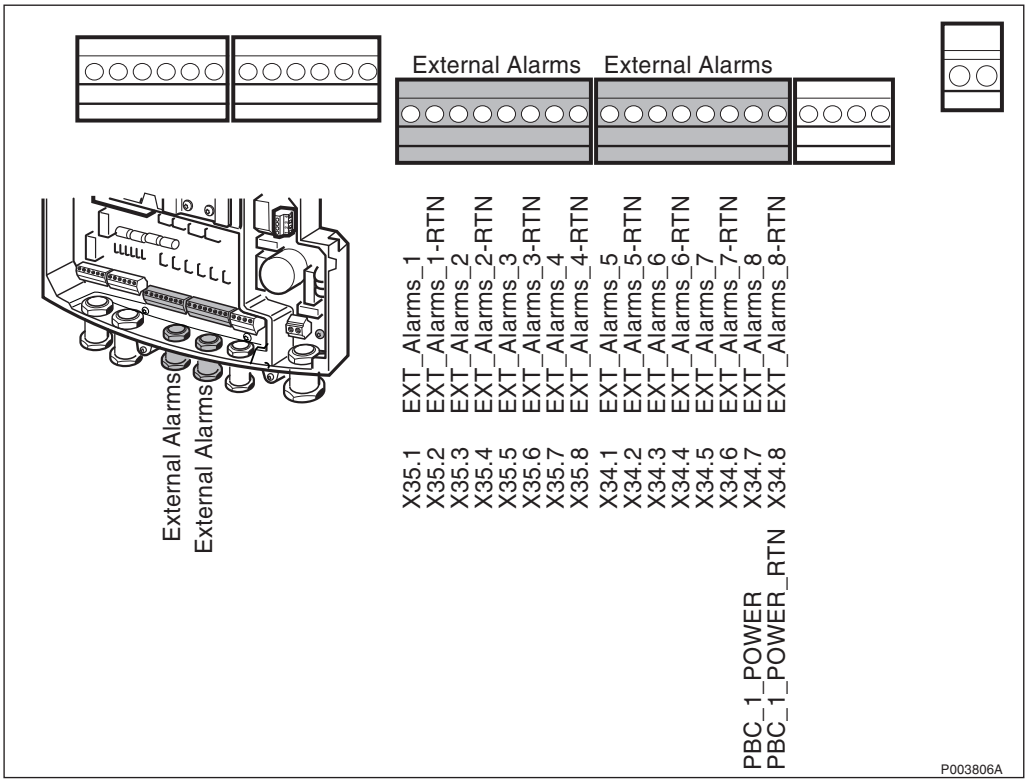

Figure 79 Connecting external– and PBC alarm cables

2. Connect the external alarm cable to the termination block.

5.10.8 Connecting the Extended OMT cable (optional)

The extended OMT is an option. With the extended OMT cable the RBS can be accessed without having to climb a ladder, if the RBS is mounted on a pole or mast.

1. Dismantle the extended OMT cable and mount the cable inlet, *see Section 5.10.4 on page 84*.

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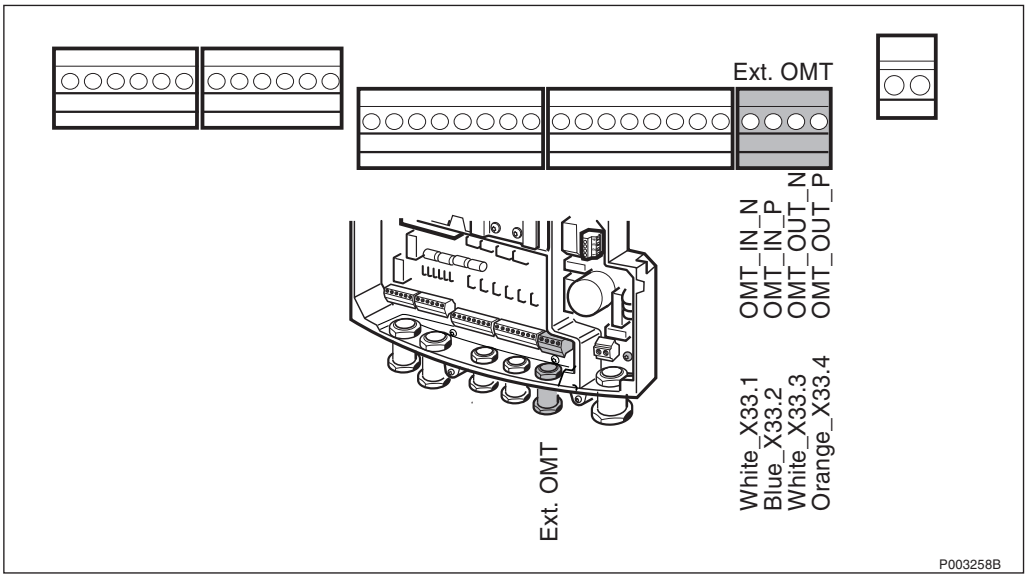

Figure 80 Connecting the extended OMT cable

2. Mount the wires to the termination block.

Note: The two white wires are from two different twin pairs and should not be mixed.

5.10.9 Closing the Interface Box

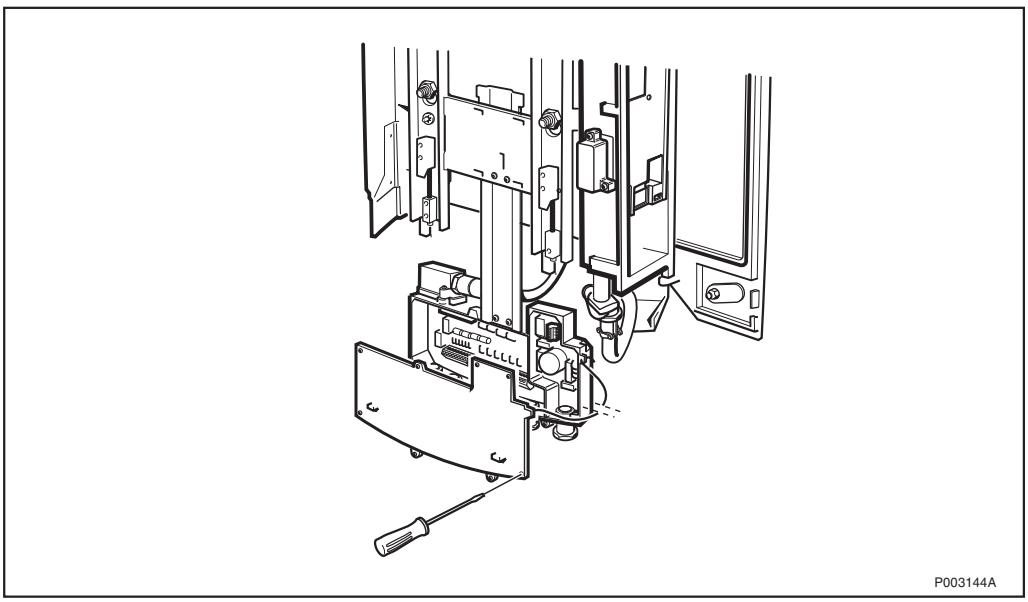

Figure 81 Closing the interface box

1. Remount the interface box cover by screwing the 8 torx screws back into position.

2. Push the interface box upwards and screw the two torx screws situated on the mounting base back into position.

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5.11 Mounting the Power Supply Adapter (Optional)

The RBS 2302 cabinet is delivered with a premounted internal battery. In order to use a Power and Battery Cabinet together with the RBS the internal battery must be replaced by a Power Supply Adapter (PSA).

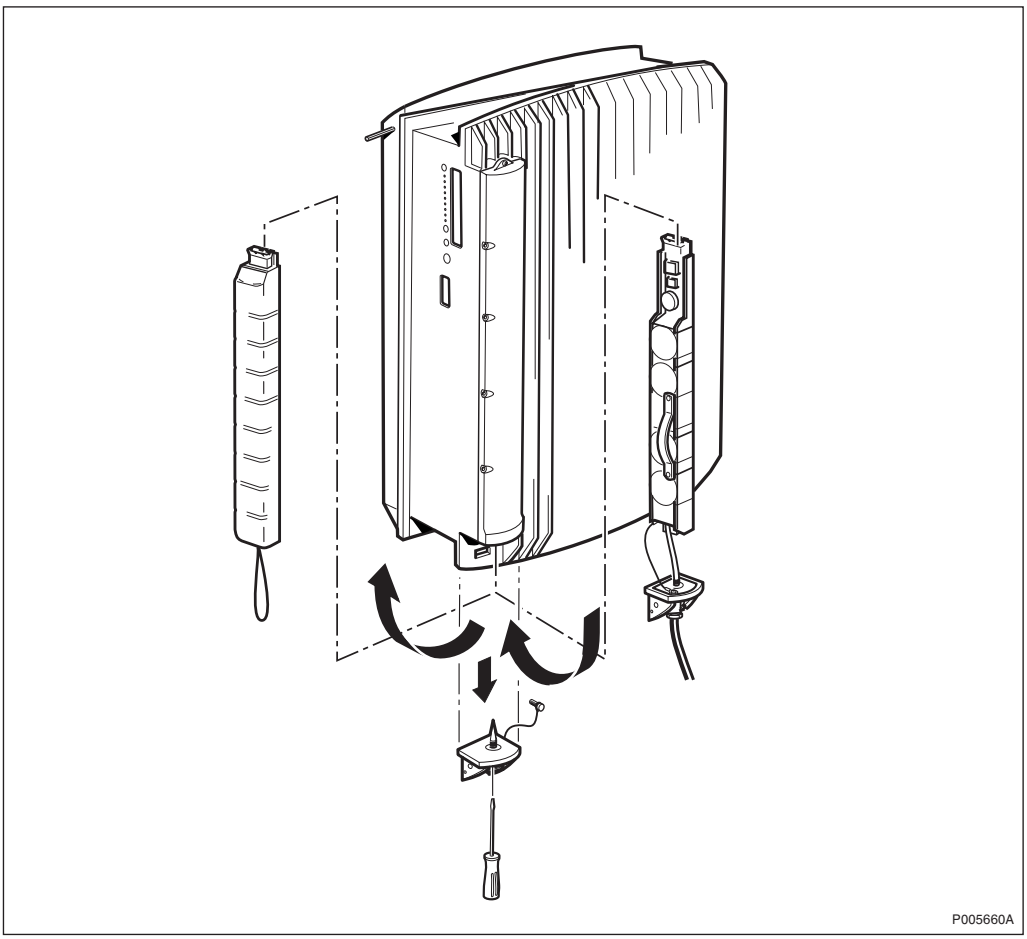

Figure 82 Switching the internal battery to the PSA

1. Open the internal RBS battery compartment by unscrewing the torx screw located on the cover.
2. Remove the internal battery.
3. Separate the cover from the cabinet by loosening the torx screw that holds the wire.
4. Insert the PSA into the battery compartment.
5. Place the lip on the cover in the mounting hole and push the cover gently into position. Make sure that the cables are not squeezed by the spring.
6. Tighten the torx screw and make sure that there is no gap between the cover and cabinet.

5.12 Mounting the Cabinet

To facilitate the mounting a lifting device may be used *see Section 5.22 Appendix, Lifting Device on page 129.*

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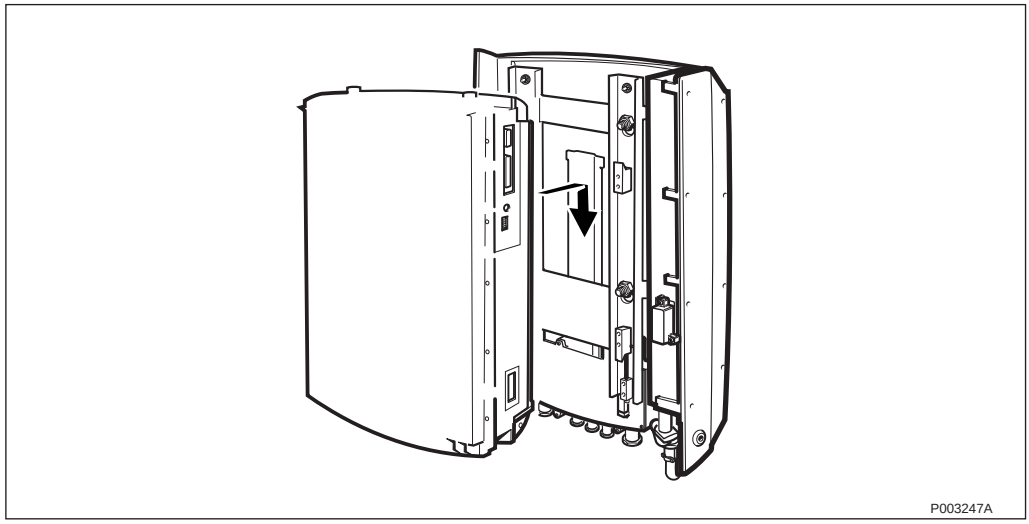

Figure 83 Mounting the cabinet

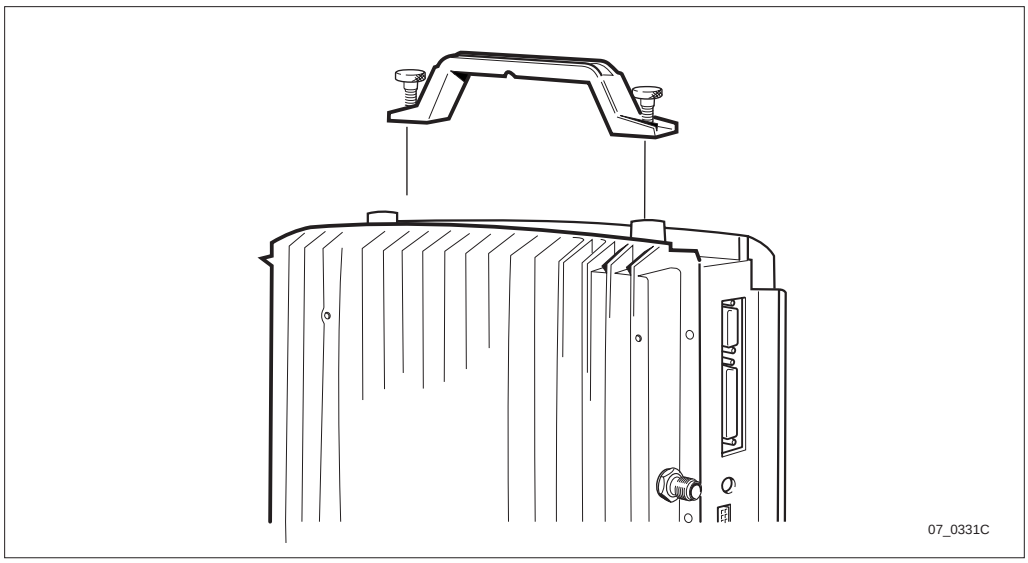

Figure 84 Mounting the lifting handle

1. Mount the lifting handle (optional) on the RBS 2302 and lift it on to the mounting base.

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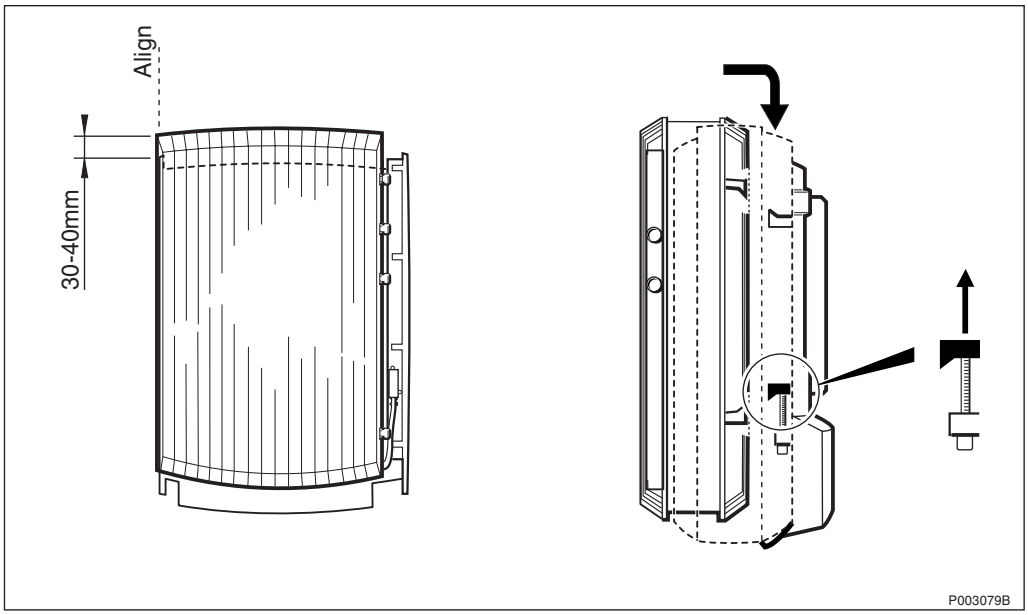

Figure 85 Facilitating mounting the cabinet on the mounting base

2. Facilitate the mounting of the cabinet by aiming for the left side of the cabinet. Start by holding the cabinet a few centimeters above the mounting base. Make sure that the hooks are according to *Figure 85 on page 106*.
3. Hook on the cabinet by pushing it against the mounting base and lower the cabinet on to the hooks.
4. Make sure that the cabinet is properly mounted by verifying that the mounting screws in the installation box correspond to the holes in the cabinet.

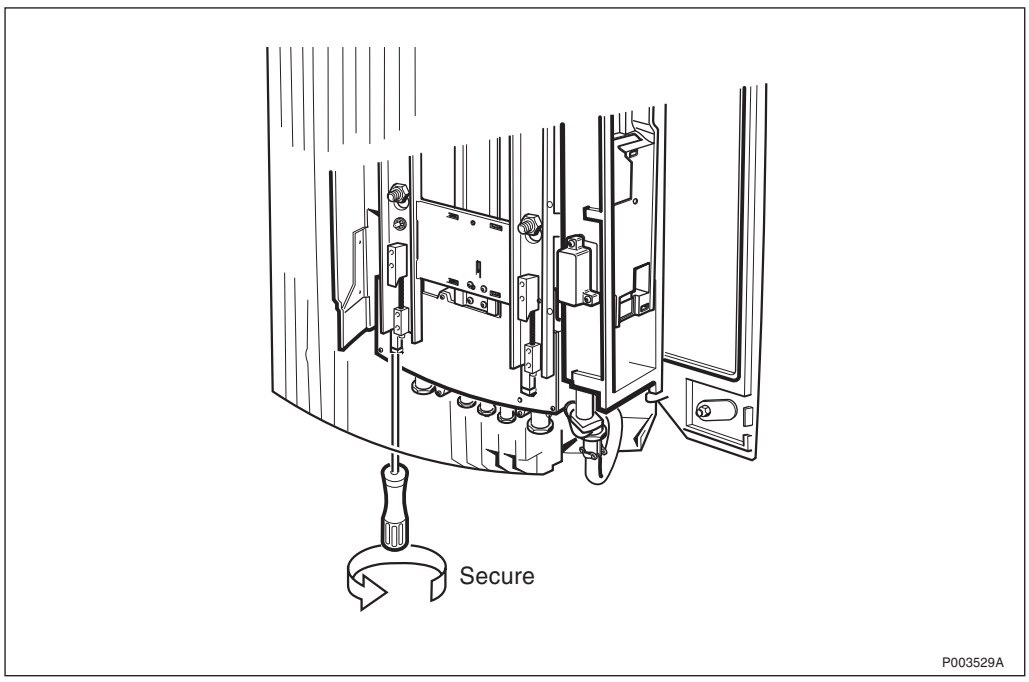

Figure 86 Securing the cabinet

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5. Secure the locking cleat under/behind the cabinet by turning the torx screws clockwise until they stop.

6. If the lifting handle has been used, remove it.

   If the lifting device has been used, remove it. Also remove the tube bracket and the lifting handle.

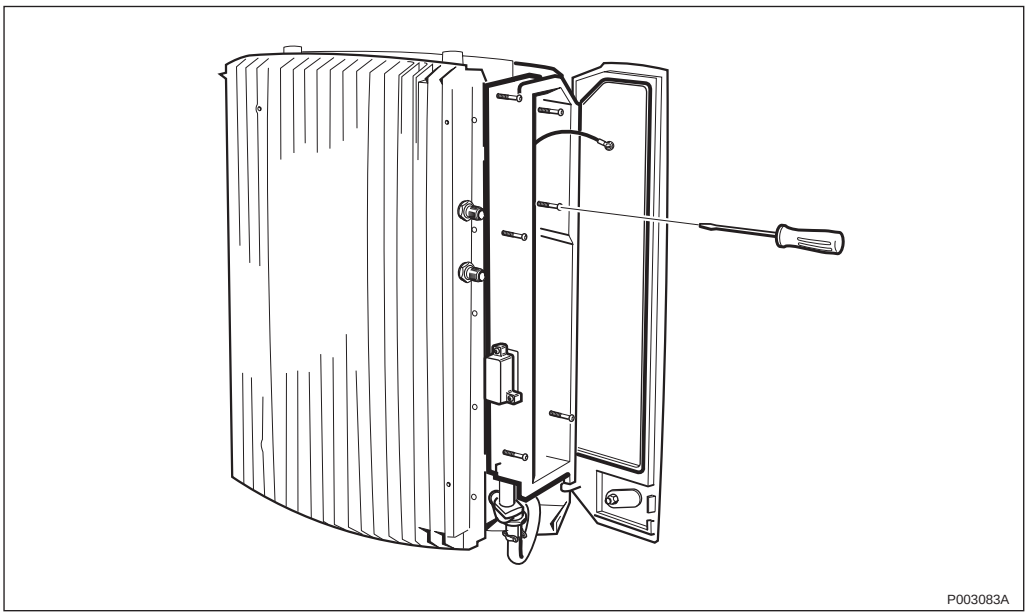

Figure 87 Fastening the installation box

7. In the installation box, turn each of the 6 torx screws until they engage the threads. When all have engaged their threads, tighten them.

5.13 Connecting Internal Cables

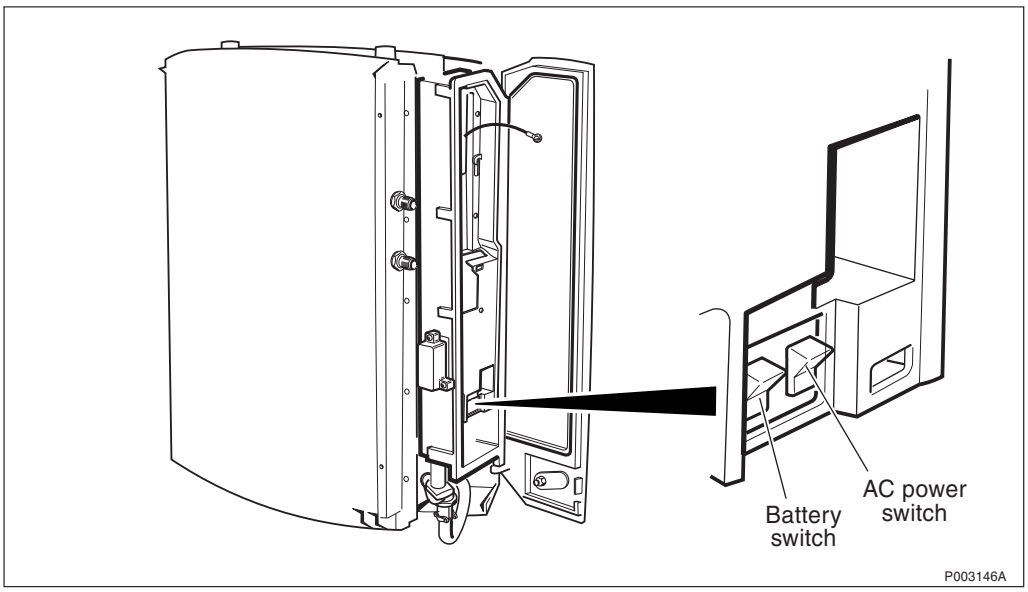

Figure 88 AC power and battery switches

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1. Make sure that the AC power and battery switches are in the OFF position.

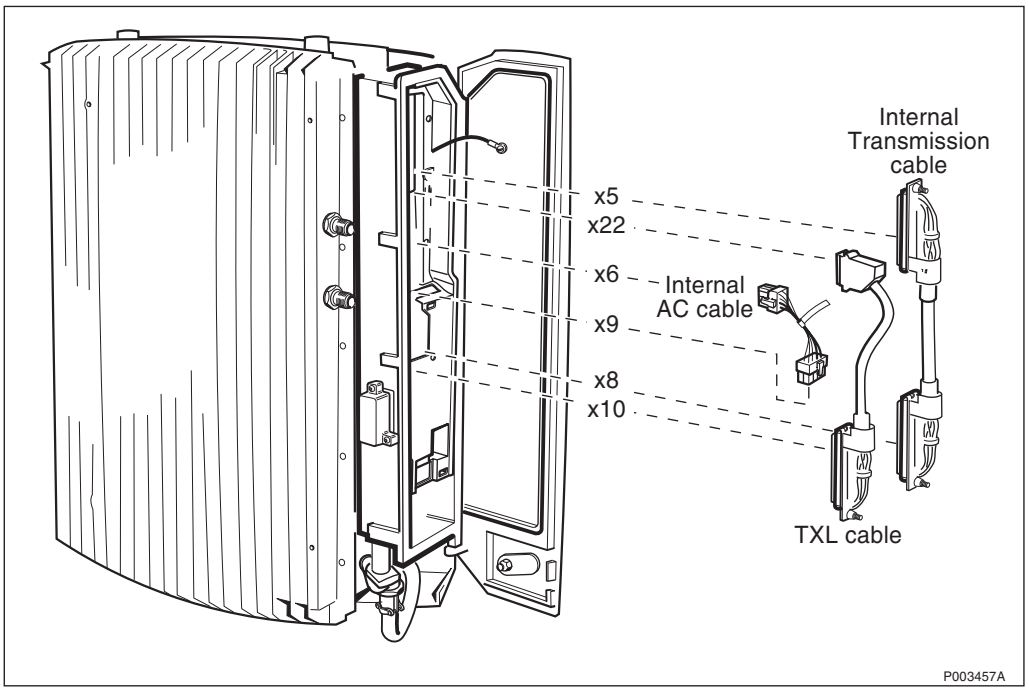

Figure 89 Connecting cables between cabinet and mounting base

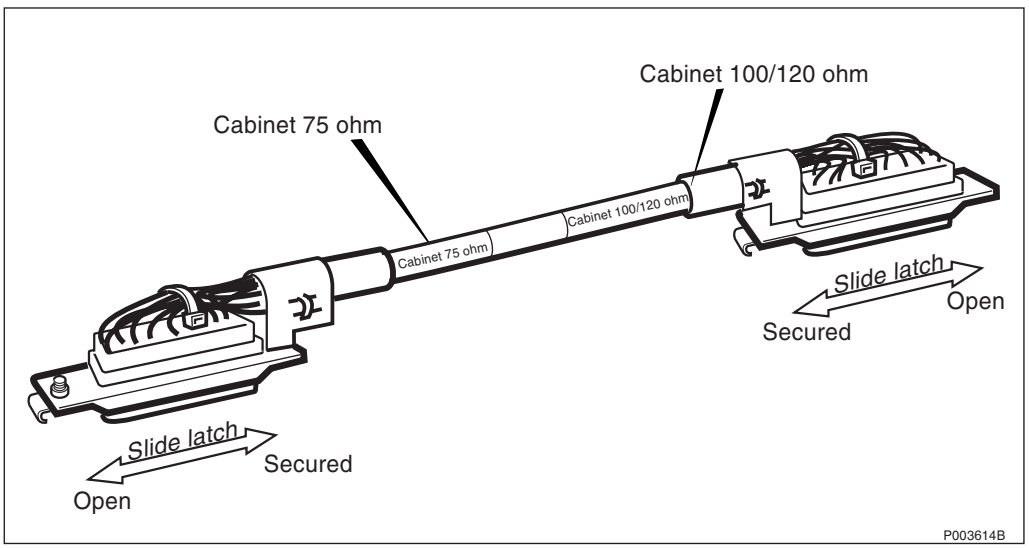

Figure 90 Transmission cable

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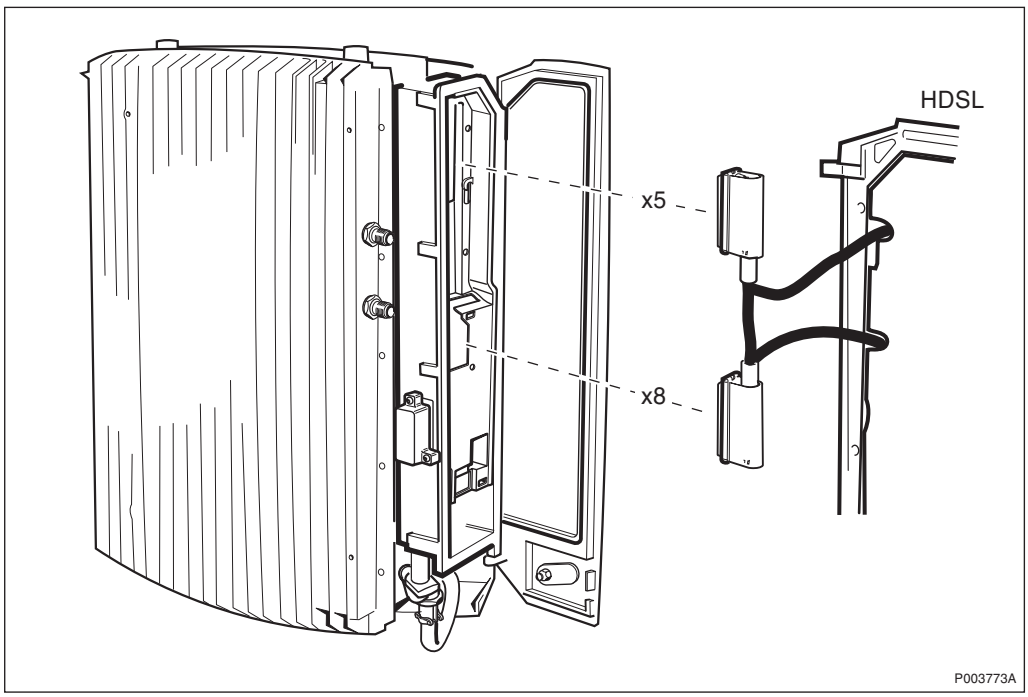

Figure 91 Connecting the HDSL modem cables

2. Connect the transmission cable:

   Without HDSL

   - Connect the transmission cable between the connection board and the cabinet. If a 75 Ω transmission system is used, insert the cable end marked Cabinet 75 ohm into the cabinet. If a 100/120 Ω transmission system is used, insert the cable end marked Cabinet 120 ohm into the cabinet. Secure it with the slide latch. *See Figure 89 on page 108*and *Figure 90 on page 108.*

   With HDSL

   - Connect the cables from the HDSL door to the respective connector, X5 and X8. *See Figure 91 on page 109.*

3. Connect the internal AC cable between the connection board and the cabinet.

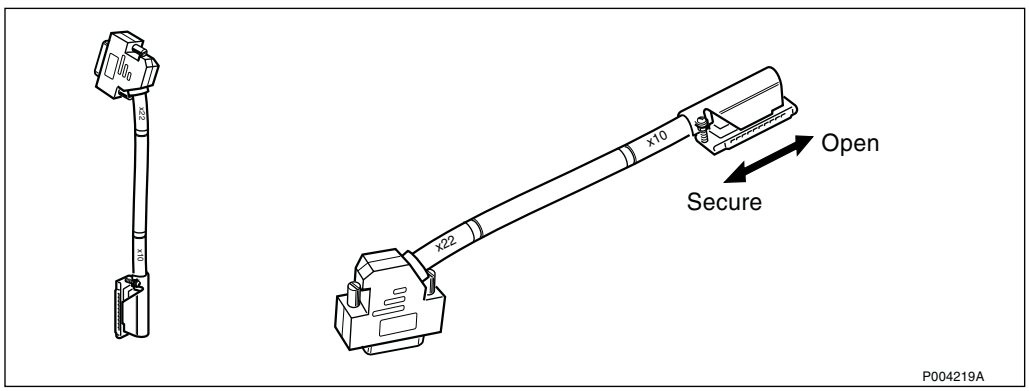

Figure 92 TXL cable

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4. Connect the TXL cable between the connection board and the cabinet. Secure it on one side with the slide latch and on the other with the locking screw.
5. Remount the outer protective cover.

5.14 Mounting the Sector Antenna (optional)

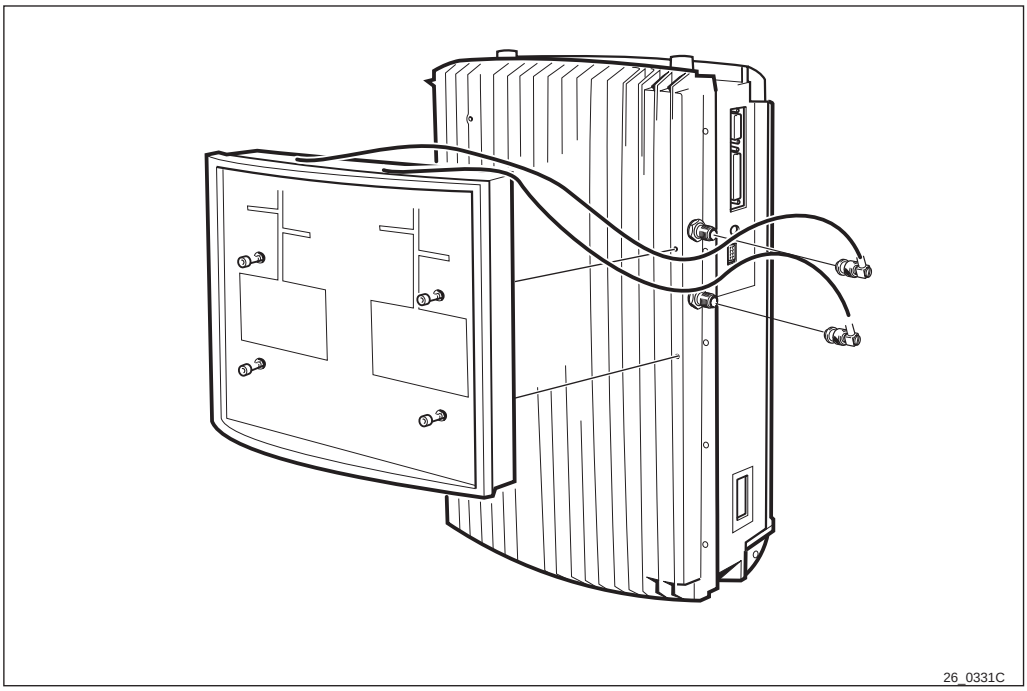

Figure 93 Mounting the sector antenna

1. Mount the antenna and fasten the four screws.

Note: Make sure that no cables are bent or squeezed.

2. Connect the antenna cables.

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5.15 Mounting the Omnidirectional Antenna (optional)

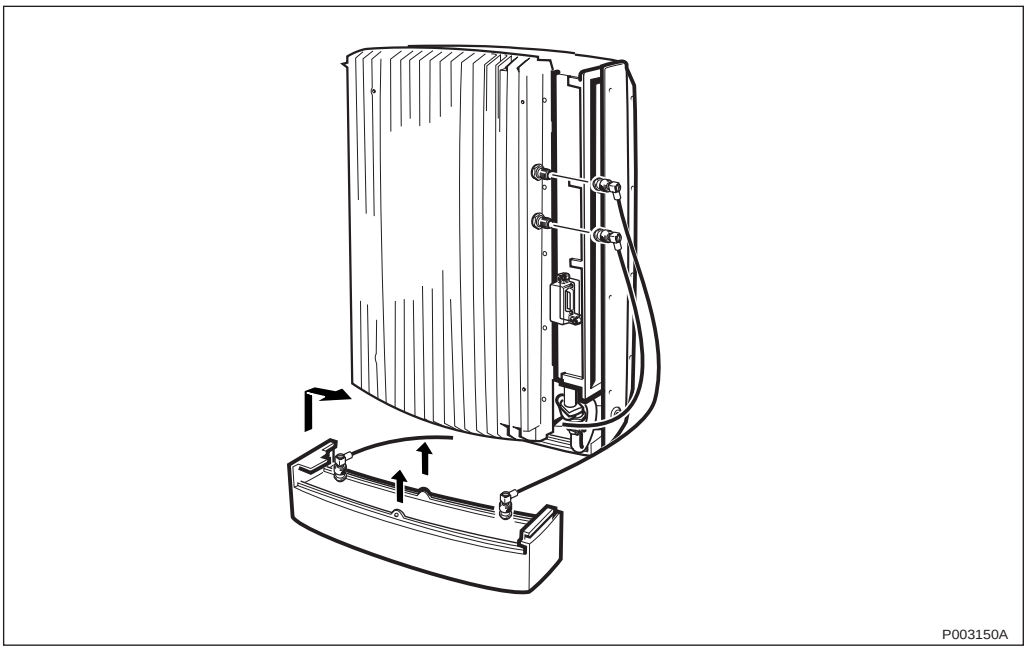

Figure 94 Mounting the omnidirectional antenna

Note: The omnidirectional antenna can only be mounted if the left sunshield is mounted.

1. Hook on the omnidirectional antenna, on the left side of the cabinet.

Note: Make sure that no cables are bent or squeezed.

2. Push it up until it snaps in place. The fasteners are situated in the middle.
3. Connect the antenna cables.

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5.16 Mounting the Multicasting Box (optional)

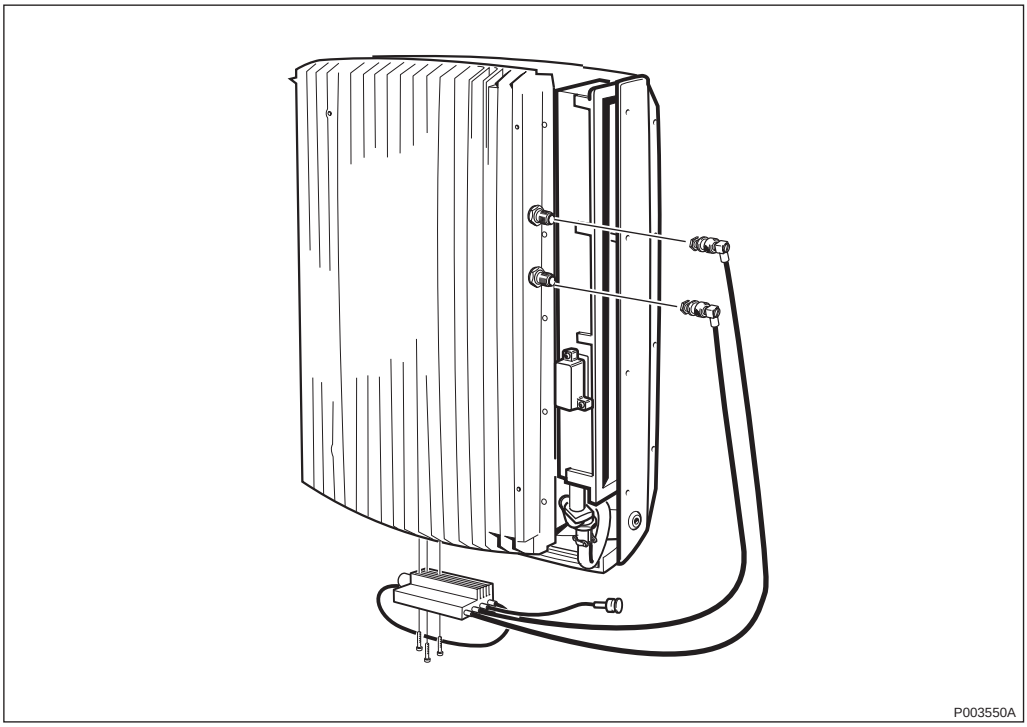

Figure 95 Mounting the multicasting box

Note: The multicasting box must be mounted before the sunshields.

For information regarding antenna configuration see allocation drawing 193 26–IPA xxxx in the Site Installation Documentation.

1. Mount the multicasting box with three torx screws on the bottom of the cabinet.
2. Connect the antenna jumper cables to the TNC connectors on the cabinet: TX/RX A output to connector X2, and TX/RX B output to connector X3.

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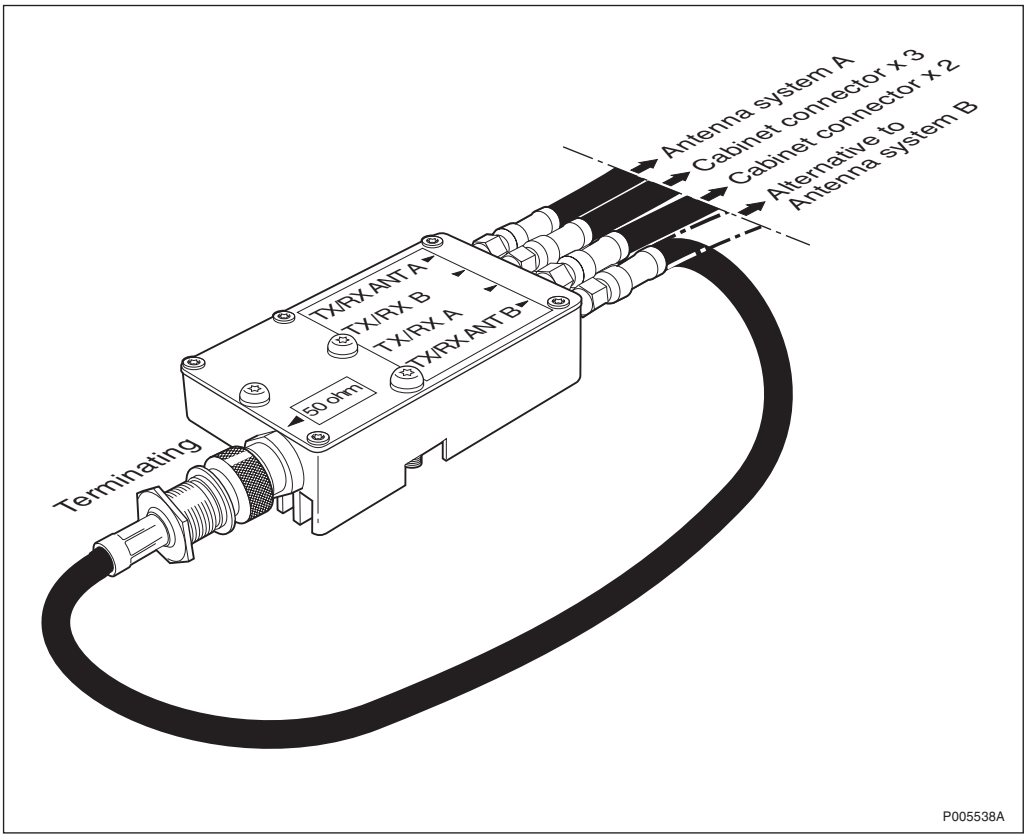

Figure 96 Connecting antenna cables to the multicasting box

3. Connect the antenna cable(s) to the antenna system(s).

   If only one antenna system (A) is used the second antenna system (B) output must be terminated by the built-in 50 Ω load, according to the figure above.

   If a second distributed antenna system (B) is used, connect it to the TX/RX ANT B antenna output.

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5.17 Connecting the External Antenna Jumpers to the RBS (optional)

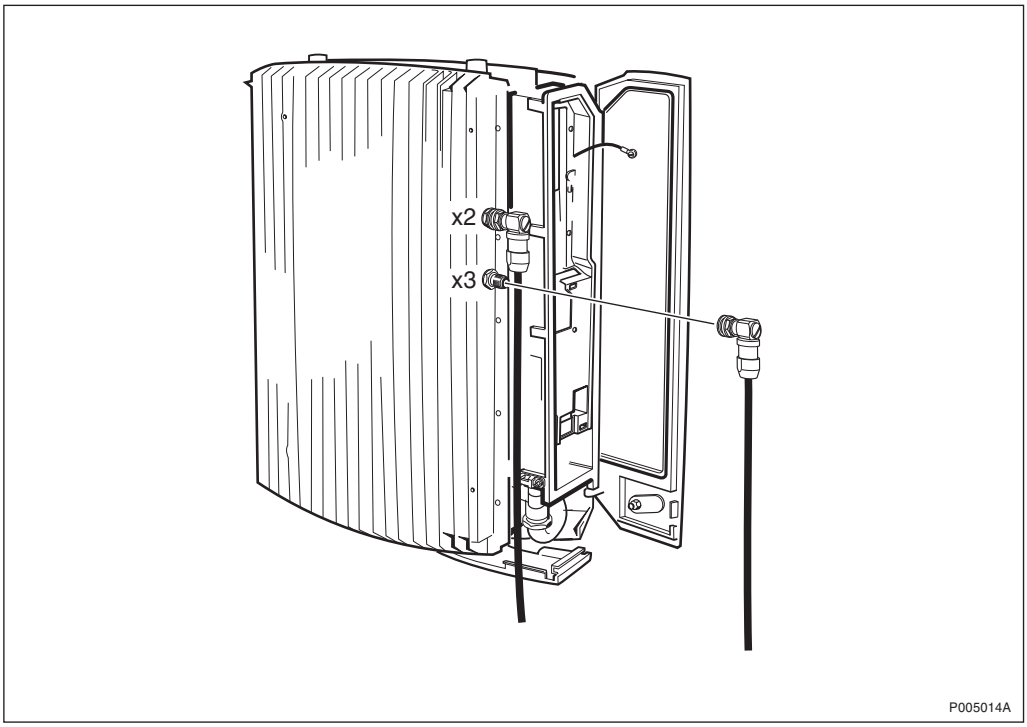

Figure 97 Connecting the antenna jumper cable to the RBS

For the sake of clarity the cabinet is shown without the sunshields.

1. Connect the antenna jumper cable to the connector labled X2 on the RBS. The tightening of the nut will be done later.
2. Connect the antenna jumper cable to the connector labled X3 on the RBS. The tightening of the nut will be done later.

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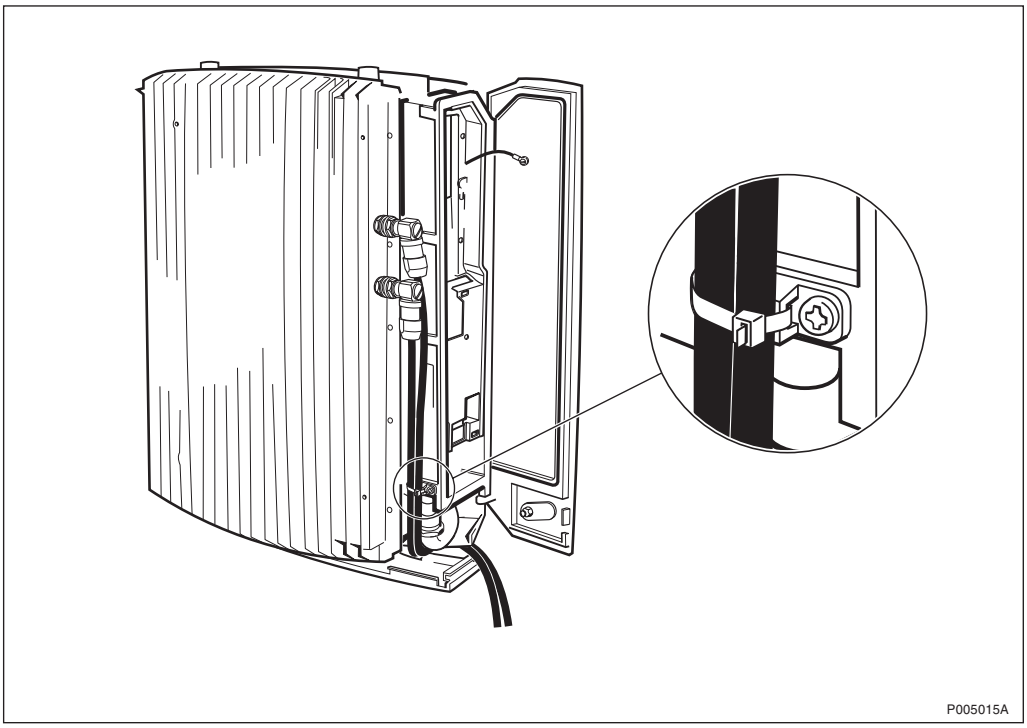

Figure 98 Installation of jumper cable

3. Route the antenna jumper cable between the lower sunshield and the mounting base, and strap the cable according to the figure above.

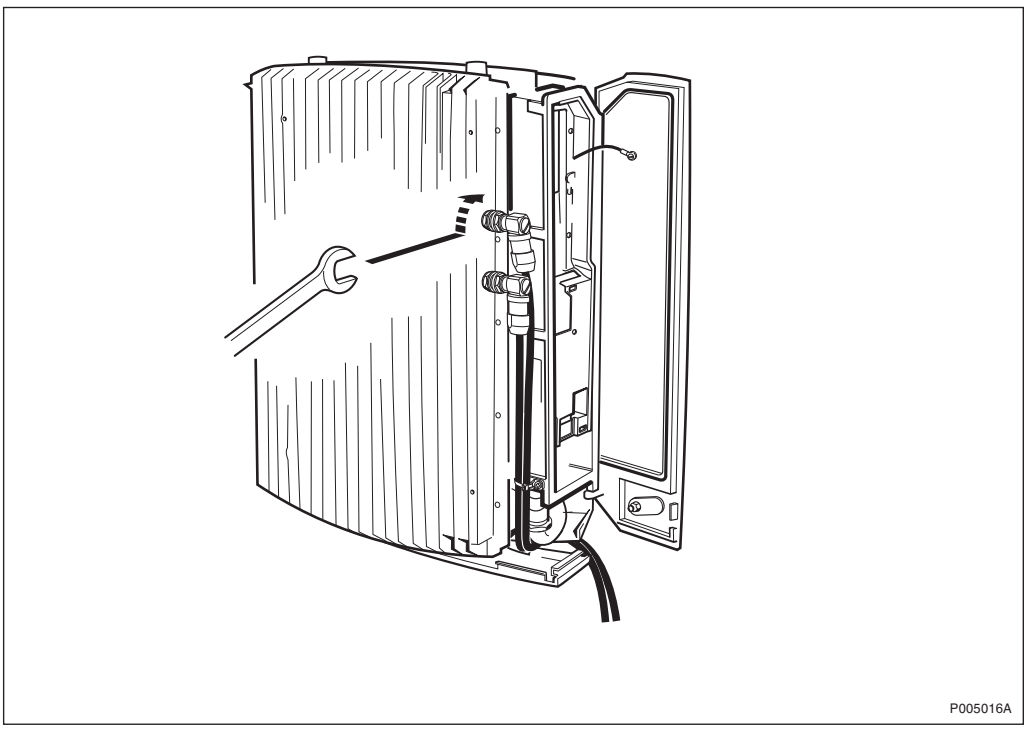

Figure 99 Tightening of the nuts for the jumper cable

4. Tighten the nuts for the conectors X2 and X3 on the RBS, according to the figure above.

For installation of the External Antenna see:

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General Installation Instructions *LZN 302 49*

For information regarding antenna configuration, see allocation drawing 193 26–IPA xxxx in the Site Installation Documentation.

5.18 Mounting the Sunshields

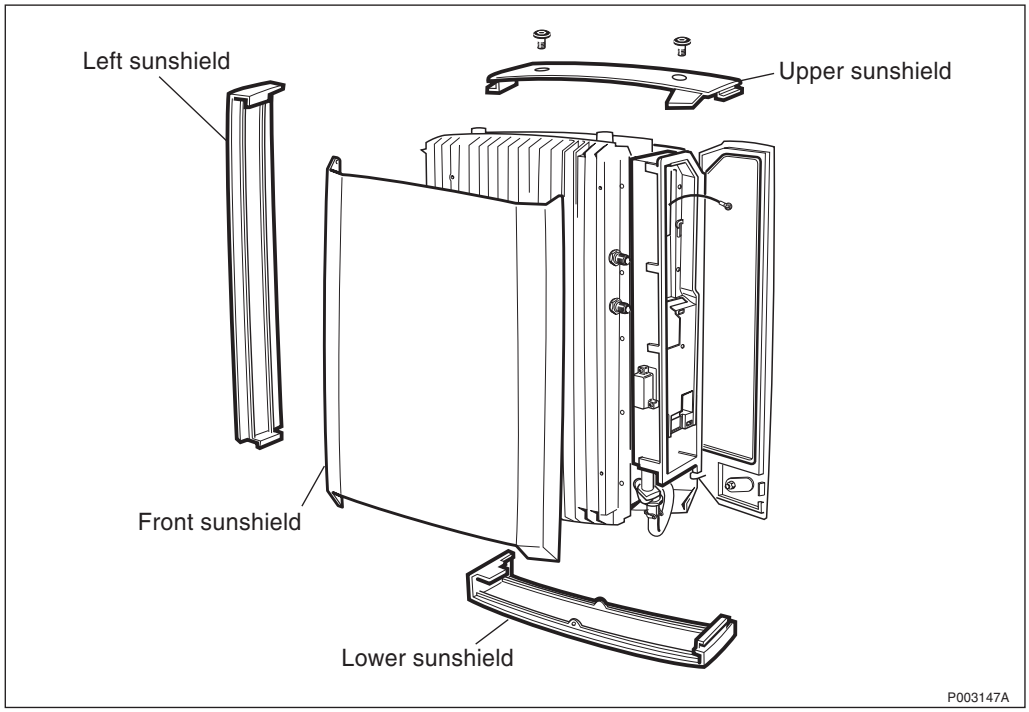

Figure 100 Main units

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5.18.1 Upper Sunshield

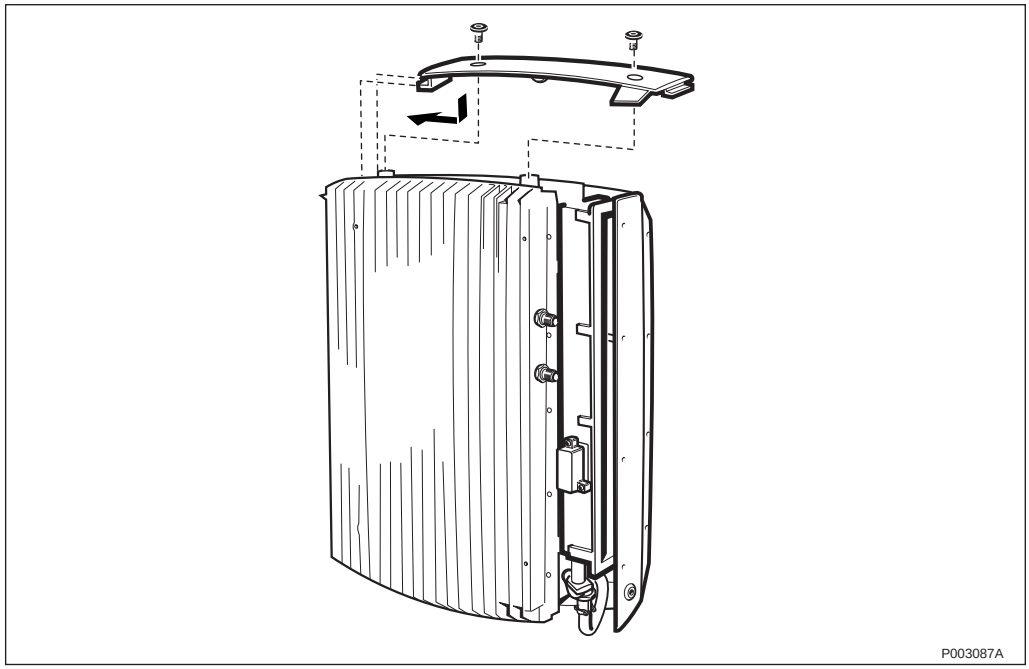

Figure 101 Mounting the upper sunshield

1. Hook on the upper sunshield on the left side.
2. Push it down until it snaps into position.
3. Seal the two holes intended for the handle using the supplied screw plugs.

Note: The plugs are to be screwed, *not* pressed.

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5.18.2 Left Sunshield

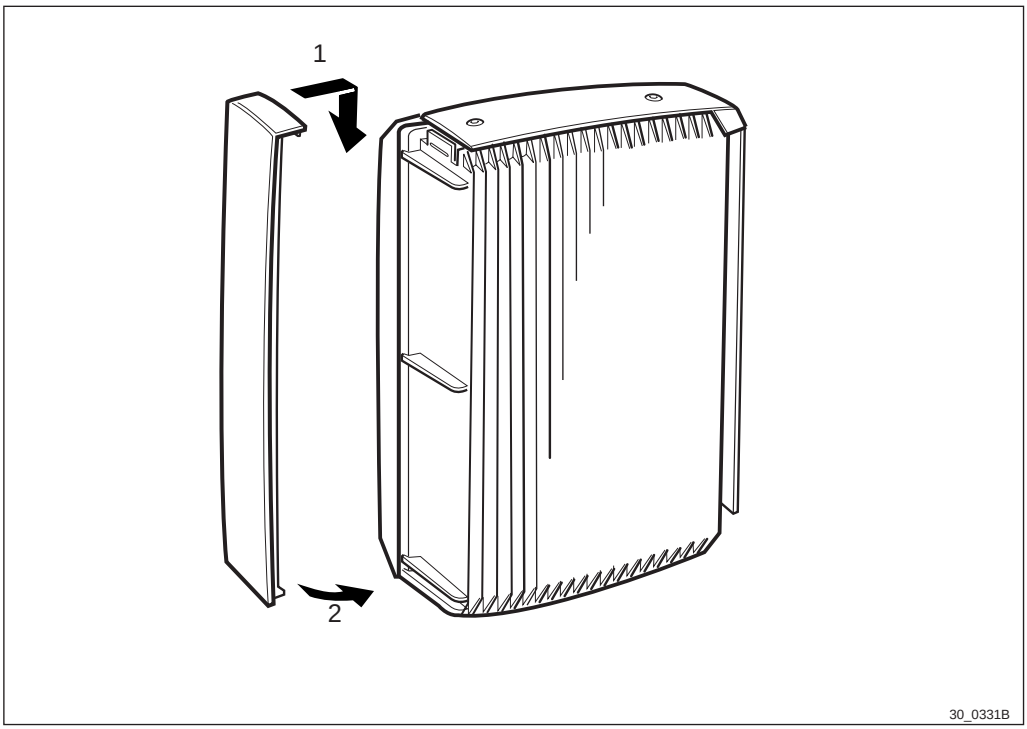

Figure 102 Mounting the left sunshield

1. Hook on the left sunshield on the left side of the cabinet.
2. Push on the lower left part of the sunshield until it snaps into position.

5.18.3 Lower Sunshield

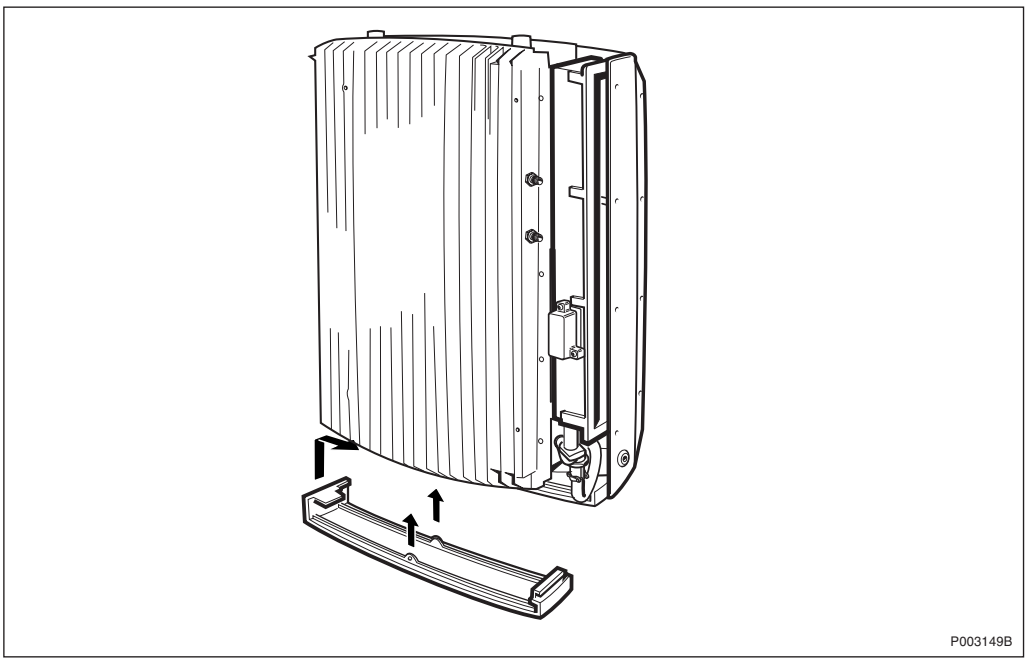

Figure 103 Mounting the lower sunshield

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Note: The lower sunshield can only be mounted if the left sunshield is mounted.

1. Hook on the lower sunshield on the left side of the cabinet.
2. Push it up until it snaps into the fasteners situated in the middle of the cabinet.

5.18.4 Front Sunshield

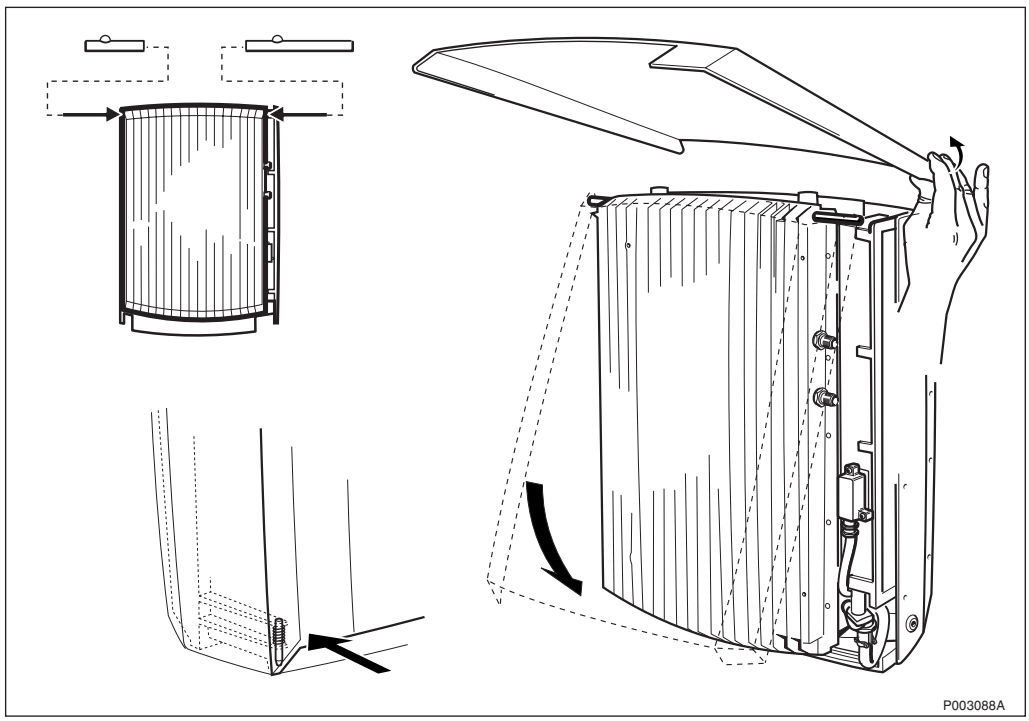

Figure 104 Mounting the front sunshield

1. Mount the short hinge-pin on the left side and the long hinge-pin on the right side.
2. Hook on the front sunshield onto the hinges and fold down the cover.
3. Press on the lower left hand corner so that the spring locking pin snaps into position.

5.19 4 and 6 TRX Configuration (optional)

The RBS configuration can supply a extension for both 4 and 6 TRX configuration. That means one or two additional RBSs. This is done to increase radio capacity. The PCM cable is connected to the Master radio cabinet. By a TXL-bus cable the Master radio cabinet is connected to the extension cabinet 1. For the 6 TRX configuration a second extension cabinet (extension cabinet 2) is connected. The length of the TXL-bus cable is 5 meters for the 4 TRX configuration and 5+5 meters for the 6 TRX configuration.

The RBS to PBC cabling for extension cabinet 1 and cabinet 2 is the same as for the basic RBS cabling configuration. Four external alarms can be connected for each extension radio cabinet.

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Follow this procedure to connect the TXL-bus cable.

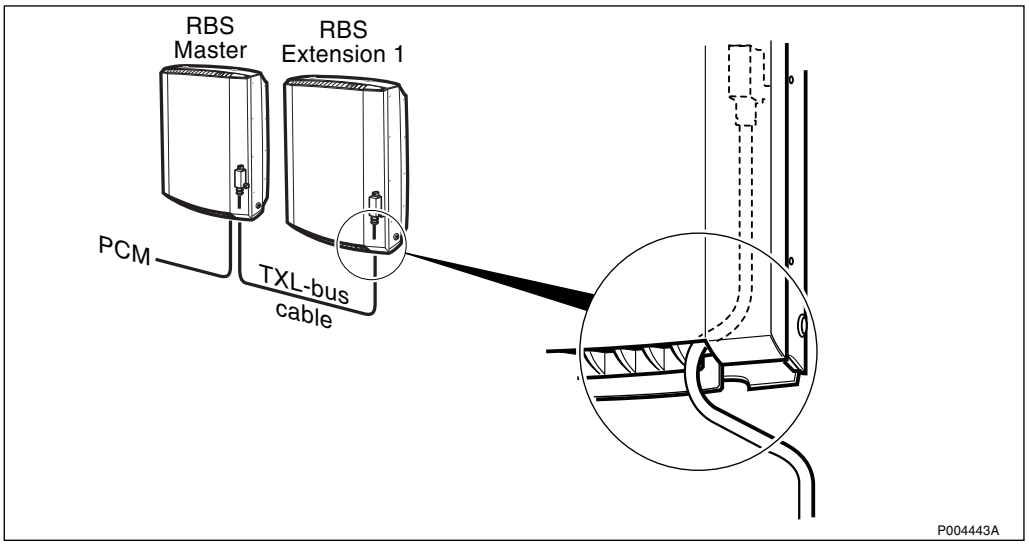

Figure 105 TXL-bus connection for 4 TRX configuration

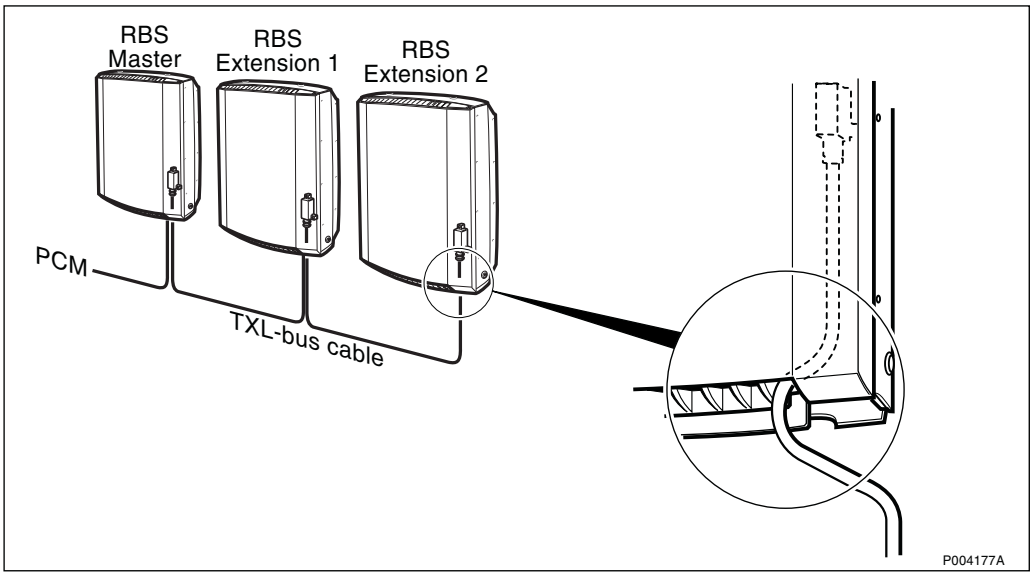

Figure 106 TXL-bus connection for 6 TRX configuration

1. Open the installation box door.
2. Open the front sunshield.
3. Remove the protection cap from the D-sub connector at the Master RBS.
4. Connect the TXL-bus cable connector marked Master to the RBS D-sub connector and secure the connection cover with two screws.
5. Pull out the cable at the frontside between the front sunshield and the first cooling flange (from right when facing the cabinet).
6. Route the cable to the next radio cabinet (Extension cabinet 1).

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7. Route the cable between the front sunshield and the first cooling flange, into Extension cabinet 1 and remove the protection cap from the D-sub connector.
8. Connect the TXL-bus cable connector marked RBS EXT 1, to the RBS D-sub connector and secure the connection cover with two screws.

   If a 4 TRX configuration is used, continue to step13.

   If a 6 TRX configuration is used, continue with the instructions below to connect the Extension cabinet 2.

The 6 TRX cable have two cables attached to the D-sub connector marked RBS EXT 1.

9. Pull out the cable at the frontside between the front sunshield and the first cooling flange.
10. Route the cable to the next radio cabinet (Extension cabinet 2).
11. Route the cable between the front sunshield and the first cooling flange, into Extension cabinet 2 and remove the protection cap from the D-sub connector.
12. Connect the TXL-bus cable connector marked RBS EXT 2, to the RBS D-sub connector and secure the connection cover with two screws.
13. Fasten all front sunshields and close all installation box doors.

5.20 Mounting the Fan Unit (optional)

DANGER

Improper electrical installation may cause fire or electrical shock. Approved circuit breakers for the AC mains and the cable's cross sectional area must always be selected in accordance with local laws and regulations. Only a qualified and authorized electrician is permitted to install and modify the electrical installation.

Protective Earth

A reliable incoming Protective Earth must be connected to the earth terminal when connecting power supply.

The earth terminal is located in the connection box, indicated by PE and the earth symbol.

Figure 107 Protective Earth

The Protective Earth connection is essential.

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Note: Make sure the AC Mains is switched off before beginning the AC installation procedure.

Note: The Fan Unit can only be mounted after the sunshields have been mounted.

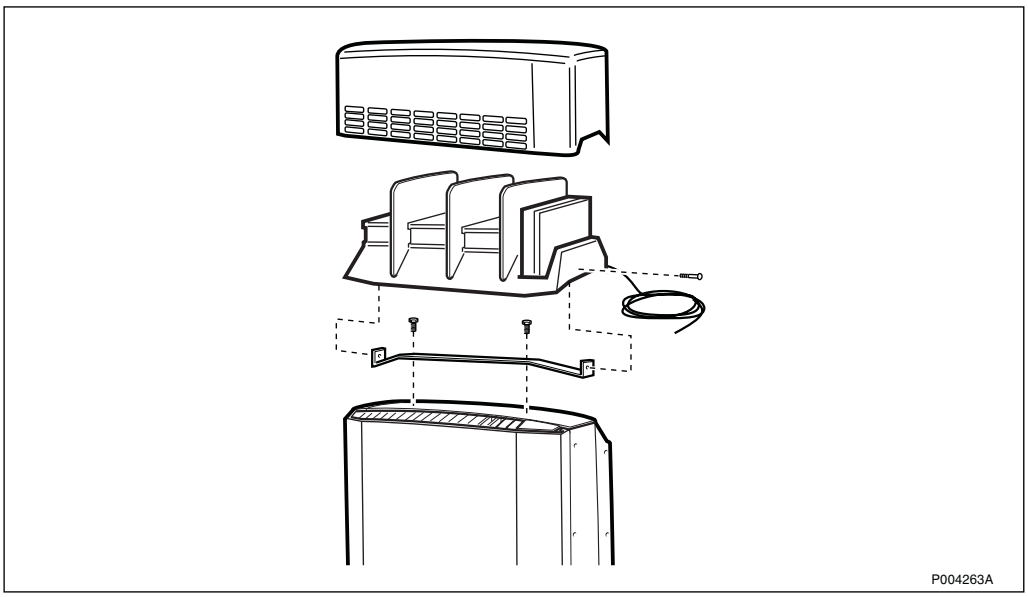

Figure 108 Fan Unit overview

1. Remove the two screw plugs on top of the radio cabinet.

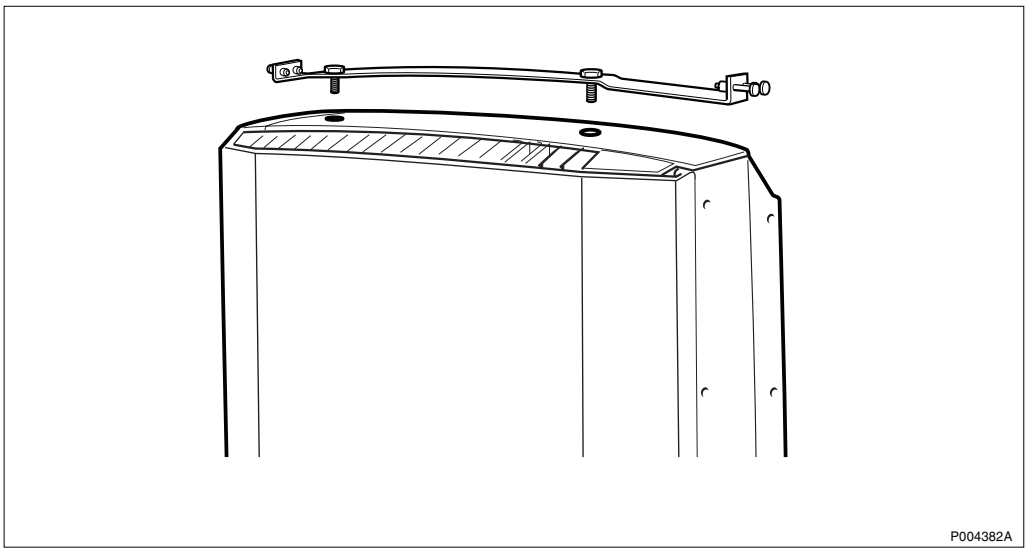

Figure 109 Mounting the relay bar

2. Mount the relay bar and fasten it with the 2 screws.

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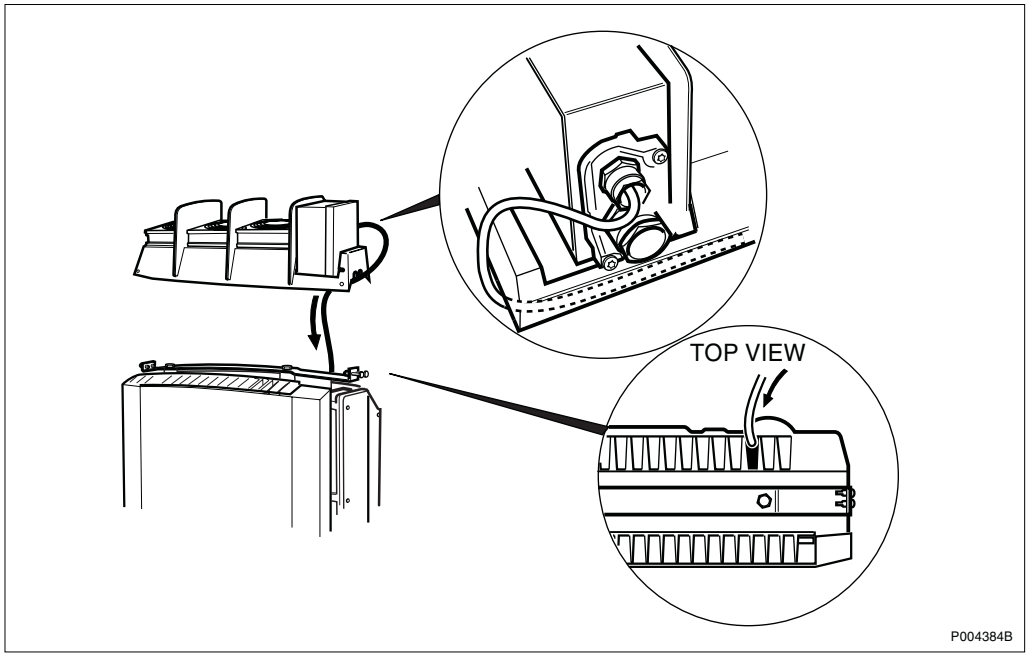

Figure 110 Routing the alarm cable through the cooling flanges

3. Route the alarm cable according to the figure above, down to the interface box through cooling flange number three, counting from the right.

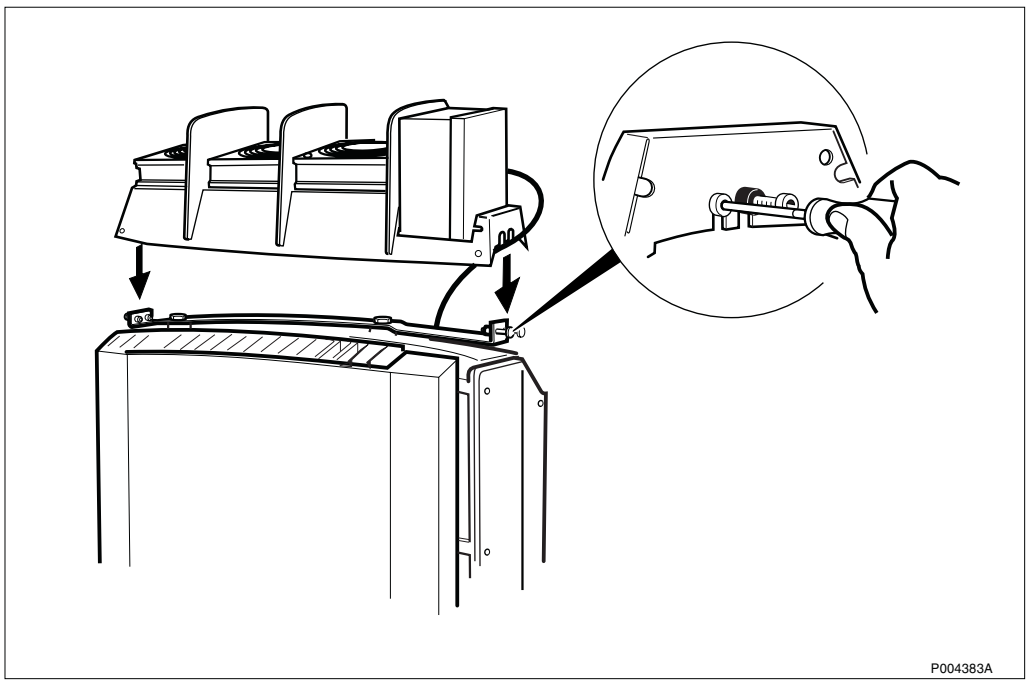

Figure 111 Mounting the Fan Unit

4. Mount the Fan Unit on the relay bar and fasten it on each side with the screws.

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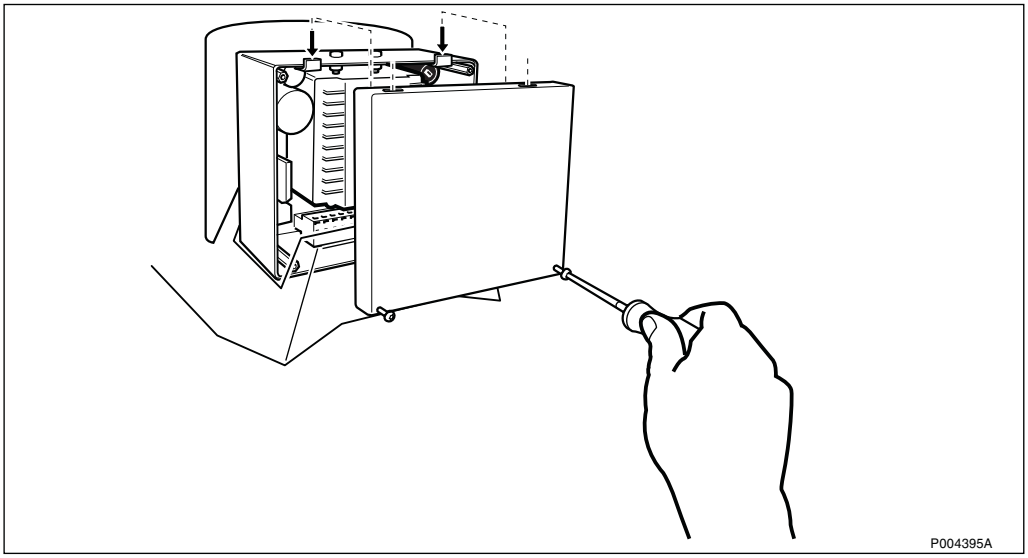

Figure 112 Opening the control box cover

5. Open the control box cover.

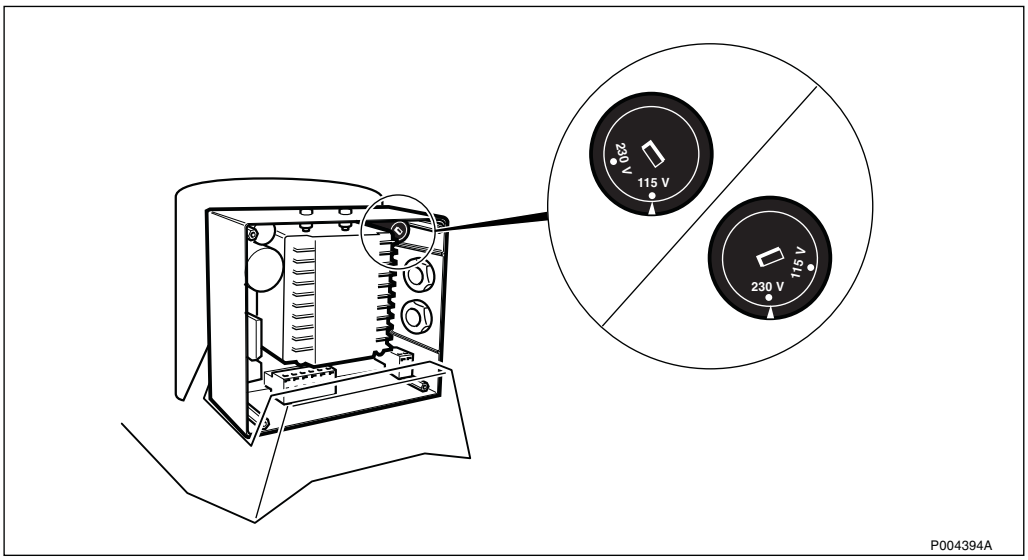

Figure 113 Adjusting the AC selector switch

6. Adjust the AC selector switch to the correct voltage present.

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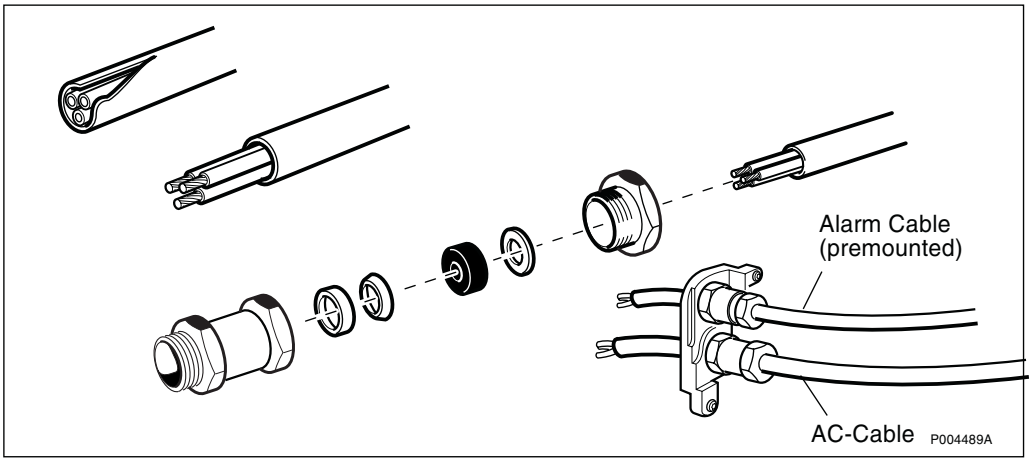

Figure 114 Cable inlets

7. Adjust the sealing grommet to the AC cable diameter and assemble the inlet details.

8. Insert the AC cable through the inlet.

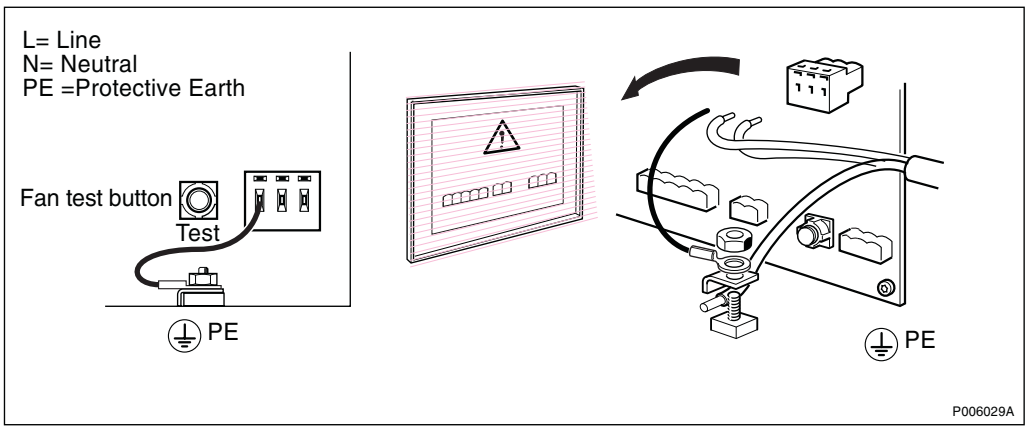

Figure 115 Connecting the AC cable and the protective earth (PE)

Note: When connecting the AC cable and the protective earth (PE), follow the instructions on the control box cover.

9. Remove the AC plinth and connect the cables to the plinth.

10. Connect the protective earth (PE).

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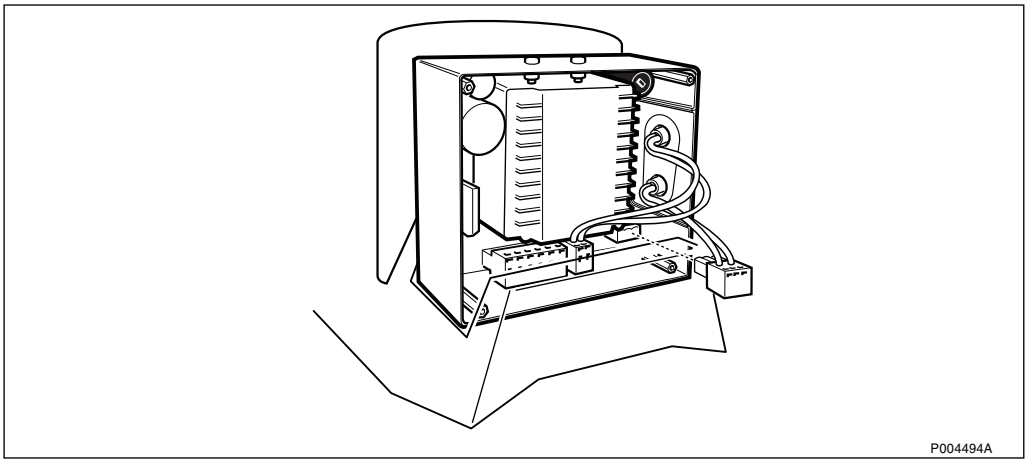

Figure 116 Remounting the AC plinth

11. Remount the AC plinth.
12. Remount the control box cover.

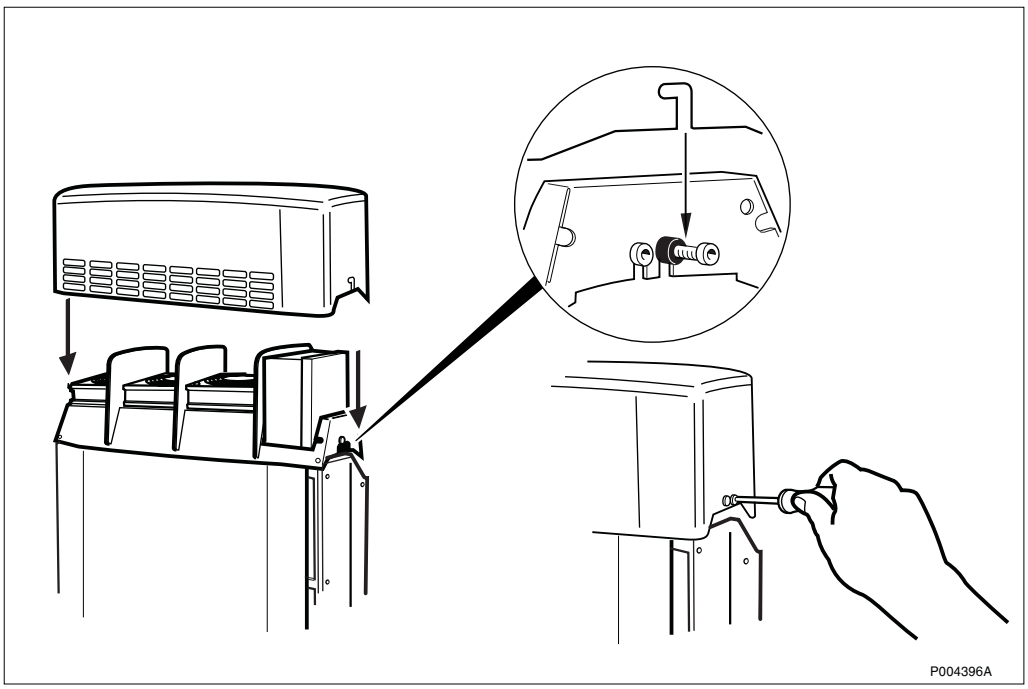

Figure 117 Mounting the Fan Unit cover

13. Mount the Fan Unit cover and fasten it with the screws on each side.

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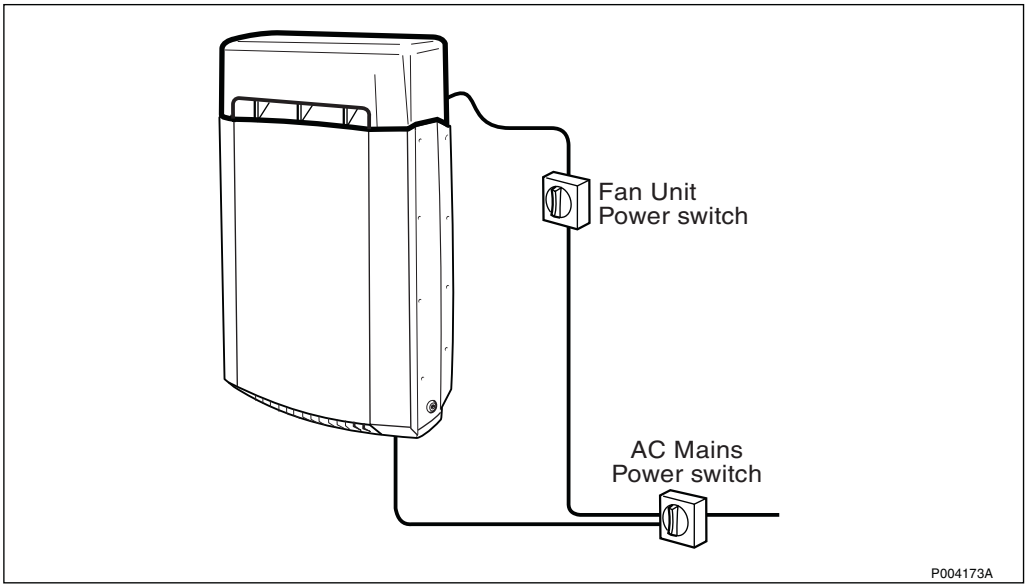

Figure 118 Connecting the AC cable

14. Route the AC cable to the current outlet.

15. Connect the cable to the outlet.

Note: The fans will automatically start when the ambient temperature is above 40 °C.

Note: The test button for the fans is located in the control box, *see Figure 115 on page 125*. To verify that all fans are working press the test button. When releasing the test button the fans will turn off. If the temperature is above 30 °C the fans will still be running due to the hysteresis of the temperature sensor.

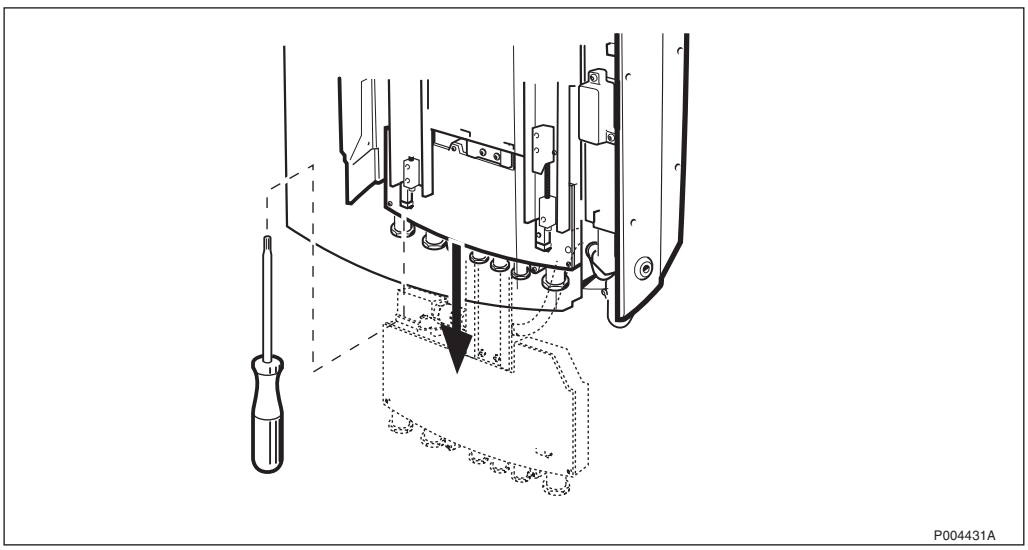

Figure 119 Pulling down the interface box

16. Loosen the screws securing the interface box placed underneath the RBS and pull down the interface box.

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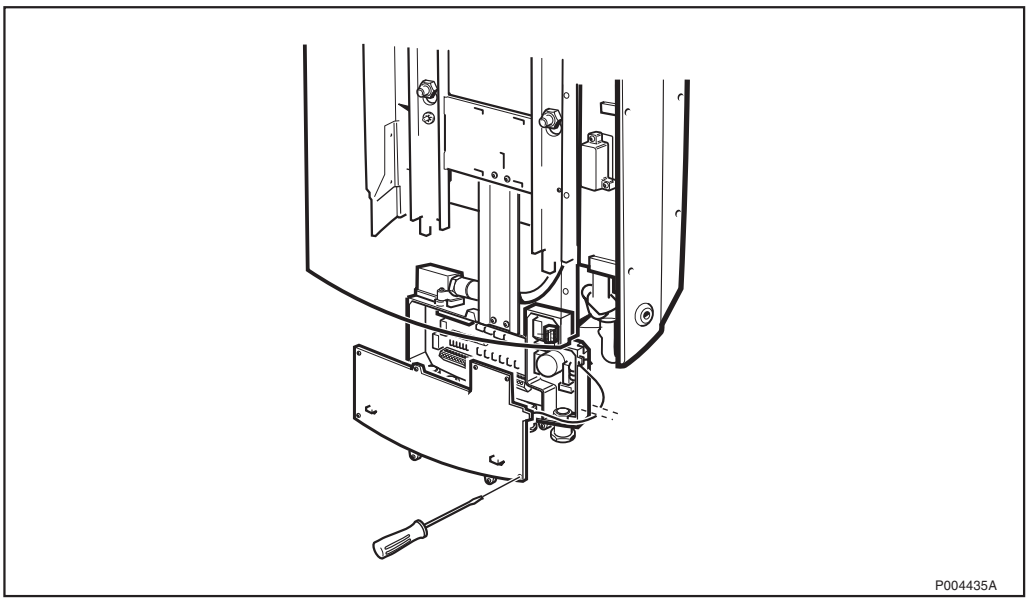

Figure 120 Opening the installation box cover

17. Unscrew the 8 torx screws on the interface box cover. Let the cover hang in the strap.

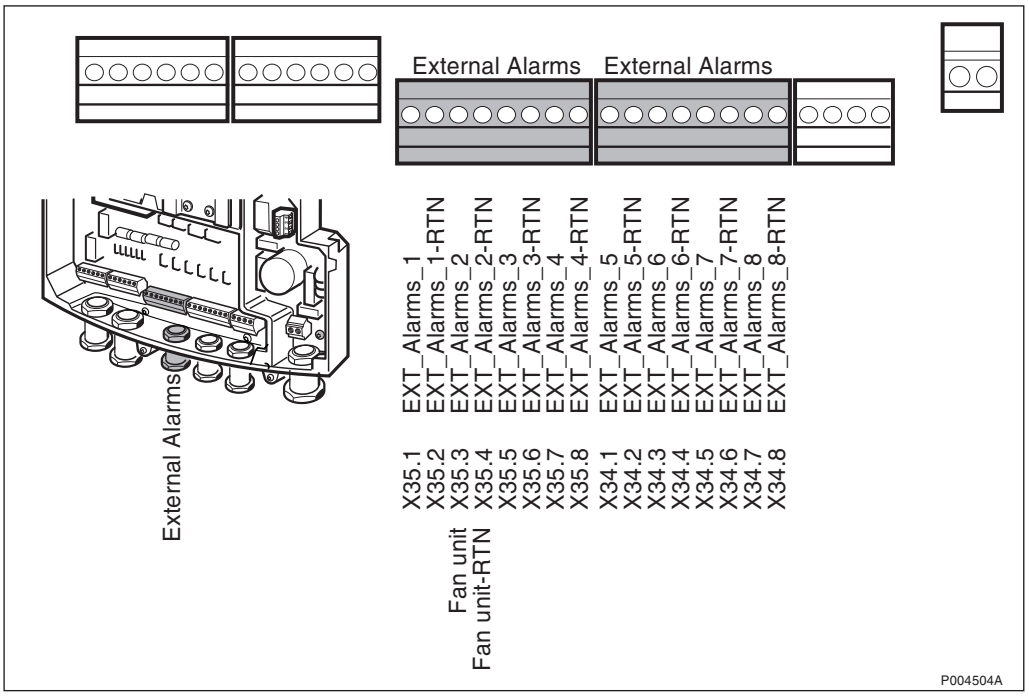

Figure 121 Connecting the alarm cable to the Interface box

18. Connect the alarm cable to the interface box.

19. Remount the installation box cover by screwing the 8 torx screws back into position.

20. Push up the interface box and secure it to the mounting base with the 2 torx screws.

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5.21 Before leaving the site

- Make sure that all cables are strapped and run in a proper way.
- Push up the interface box and tighten the screws.
- Make sure that all sunshields are in the position for being locked by the installation box door.
- Close the installation box door, tighten all screws and lock.
- Tidy up the site, remove the unnecessary materials and waste.

Note: The Site Installation Test should follow directly after the installation.

In case of ambient temperature changes between hot and cold, there is a risk of humidity damages of the components of the cabinet. To avoid this, the cabinet should not be left wihout power for more than 48 hours.

5.22 Appendix, Lifting Device

The lifting device has a lifting capacity of 25 kg.

The following units can be lifted with this device:

- RBS 2301
- RBS 2302
- PBC

Note: The lifting device is not dimensioned for the PBC assembled with batteries.

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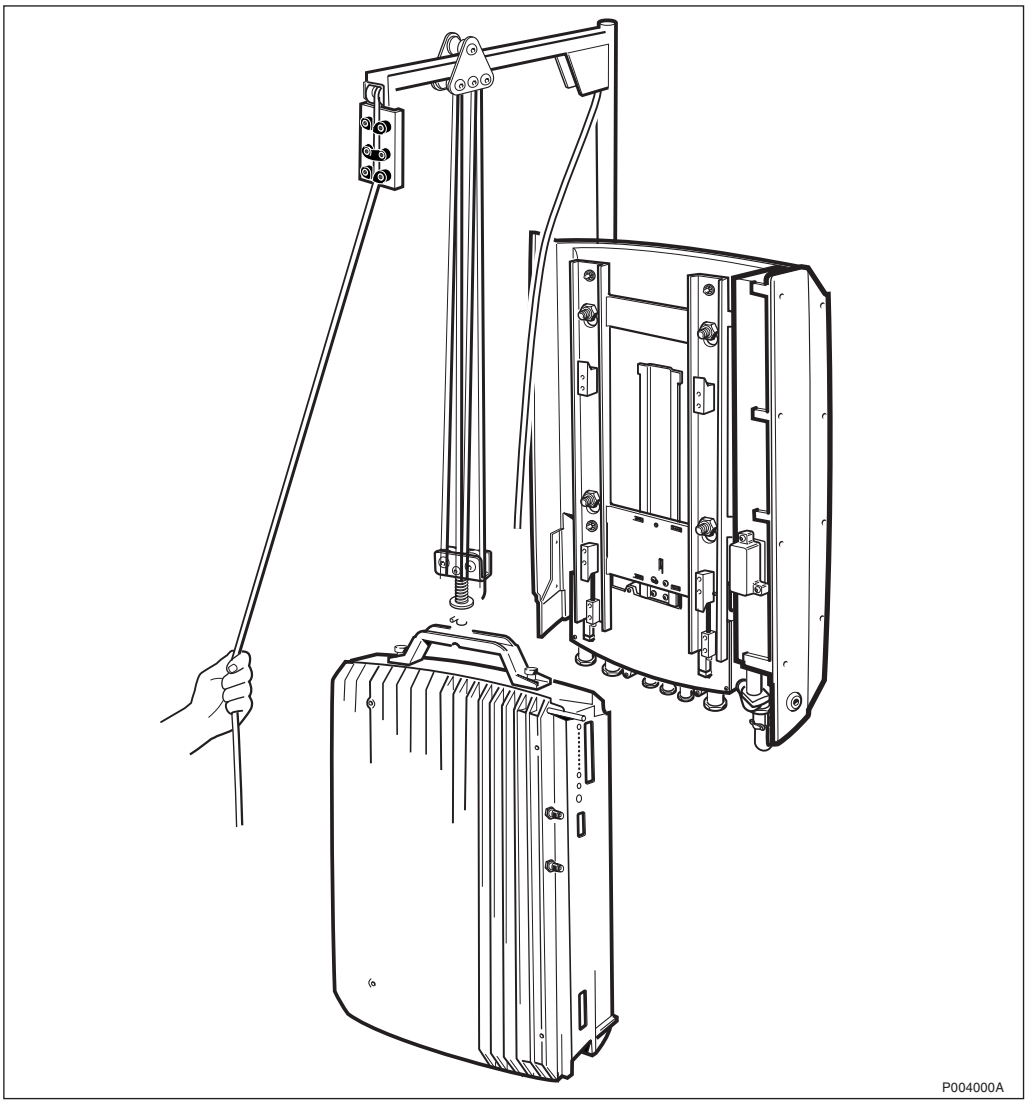

Figure 122 Lifting Device Overview

5.22.1 General

The lifting device is optional and has to be ordered separately.

The lifting device is mounted on the mounting plate only during the mounting of the cabinet. When the mounting of one cabinet is completed the lifting device is intended to be dismounted and used for the mounting of another cabinet.

The lifting device cannot be used for heights over 5 m since the rope is adjusted for a maximum height of 5 m. If a skylift or platform lift is available it is recommended to use that instead.

Free space above the cabinet must be at least 800 mm, to allow the lifting device to be installed and removed from the mounting plate.

Check that the conditions for the lifting device work are fulfilled and that the ordered equipment, specified tools and other facilities have been delivered.

The lifting device serial number is on the stop ring.

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Note: The lifting device may only be used by qualified field technician with good command of the English language.

Various Conditions

Before starting any kind of work ensure that the following conditions are met:

- Rope is undamaged
- Rope runs slightly through all the cleats.
- Inner rope has a security knot with a washer.
- Cleats are mounted and secures the rope.
- No parts have any defects or deformity.

  For example:

  – Hook spring
  – Locking pin
  – Tube bracket

- Mounting plate is mounted and secured. See the figure below regarding maximum wall loading values.

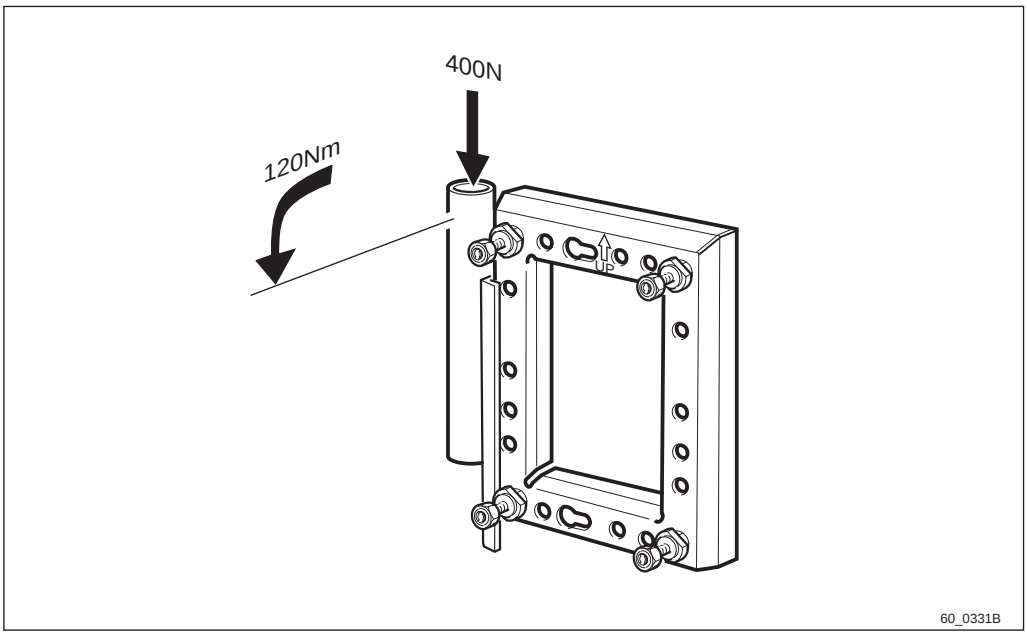

Figure 123 Maximum wall loading values

Note: Make a test lift before starting the real work.

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Unpacking

If the packaging is damaged, make an immediate complaint to the transport company. The delivered equipment shall be checked against the packing list. Make sure that no parts have any defects or deformity.

WARNING

Be confident that it is free area below during the hoisting. Risk of accidents caused by falling object.

5.22.2 Handling the Lifting Device

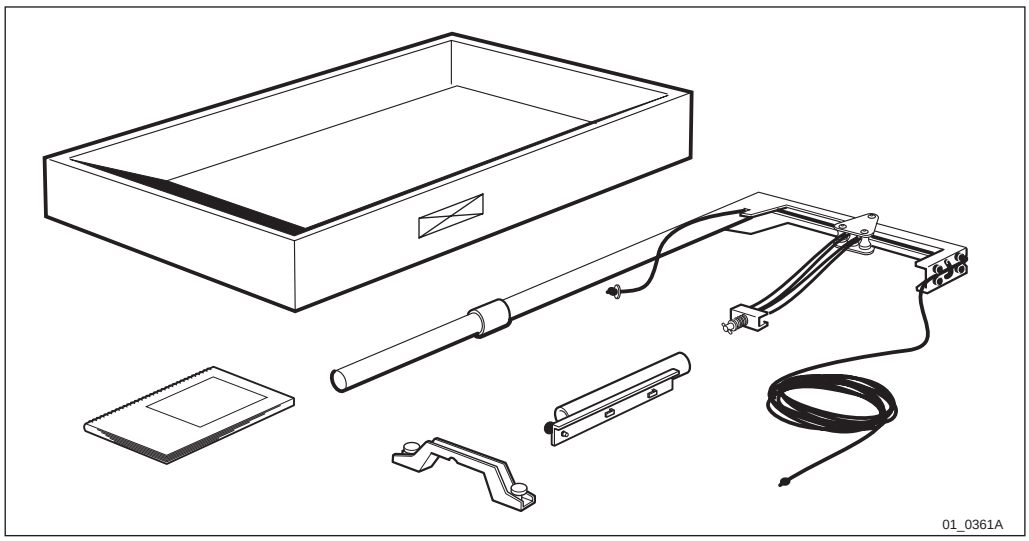

Figure 124 Equipment Overview

1. Check the delivered equipment against the packing list.

Figure 125 Label

2. Make sure that the lifting device is provided with a label.
3. Untangle the rope to facilitate the use of the lifting device.

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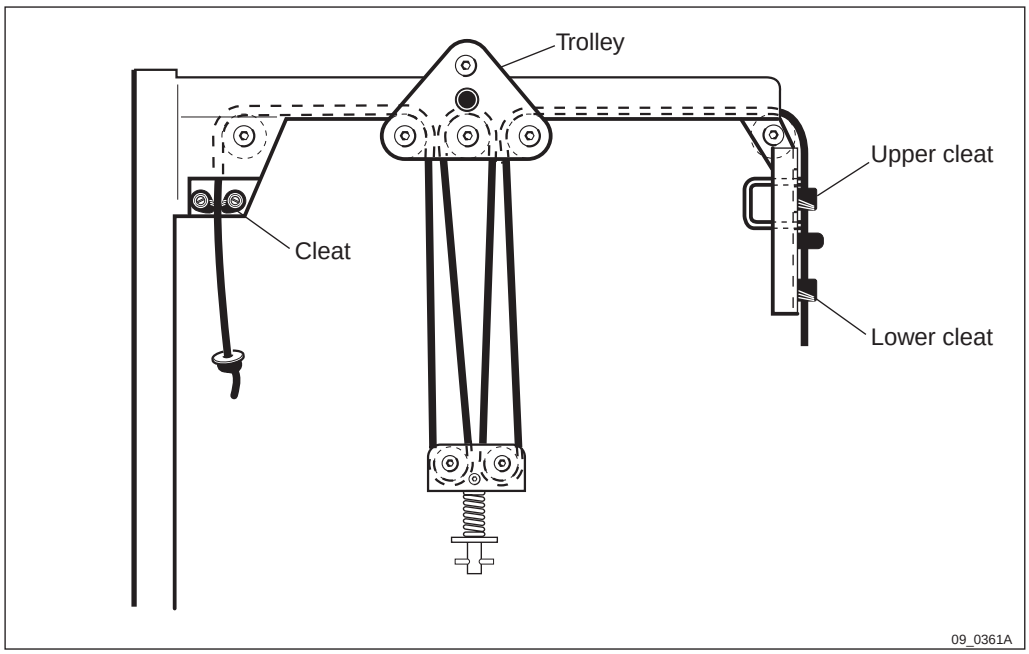

Figure 126 Rope wiring

4. Ensure that the rope is wired through the trolley and cleats in a suitable way.

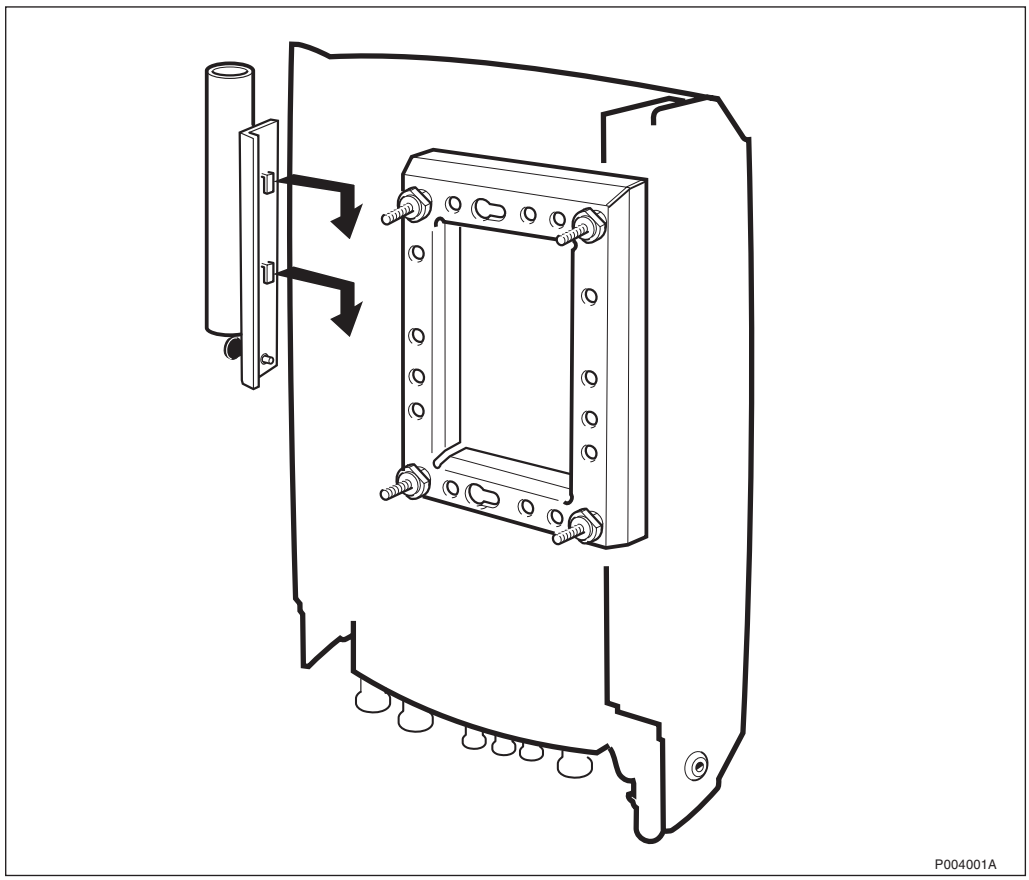

Figure 127 Mounting the lifting device

5. Mount the lifting device tube bracket on the left side of the mounting plate

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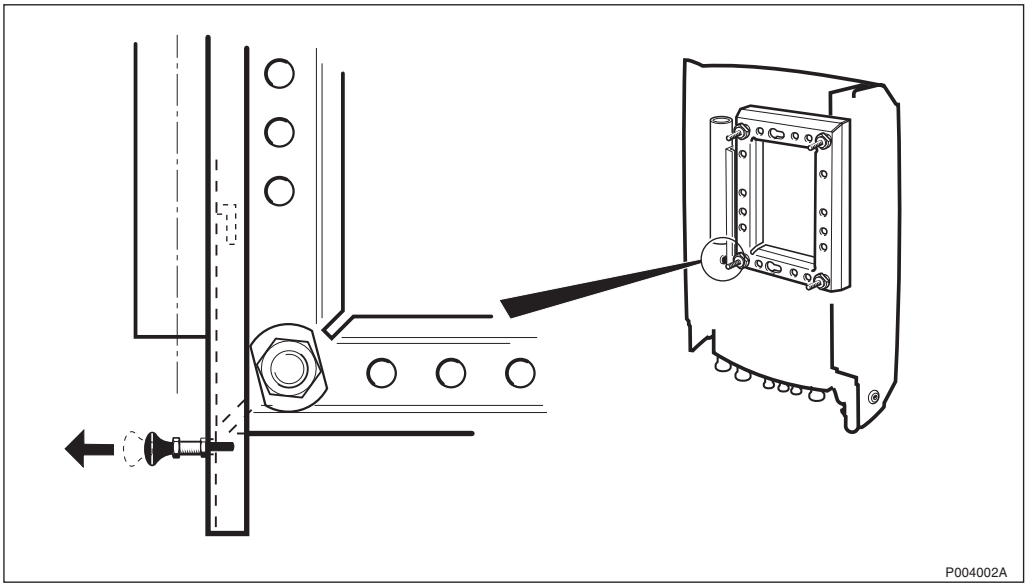

Figure 128 Locking pin position

6. Make sure that the locking pin is in the correct position.

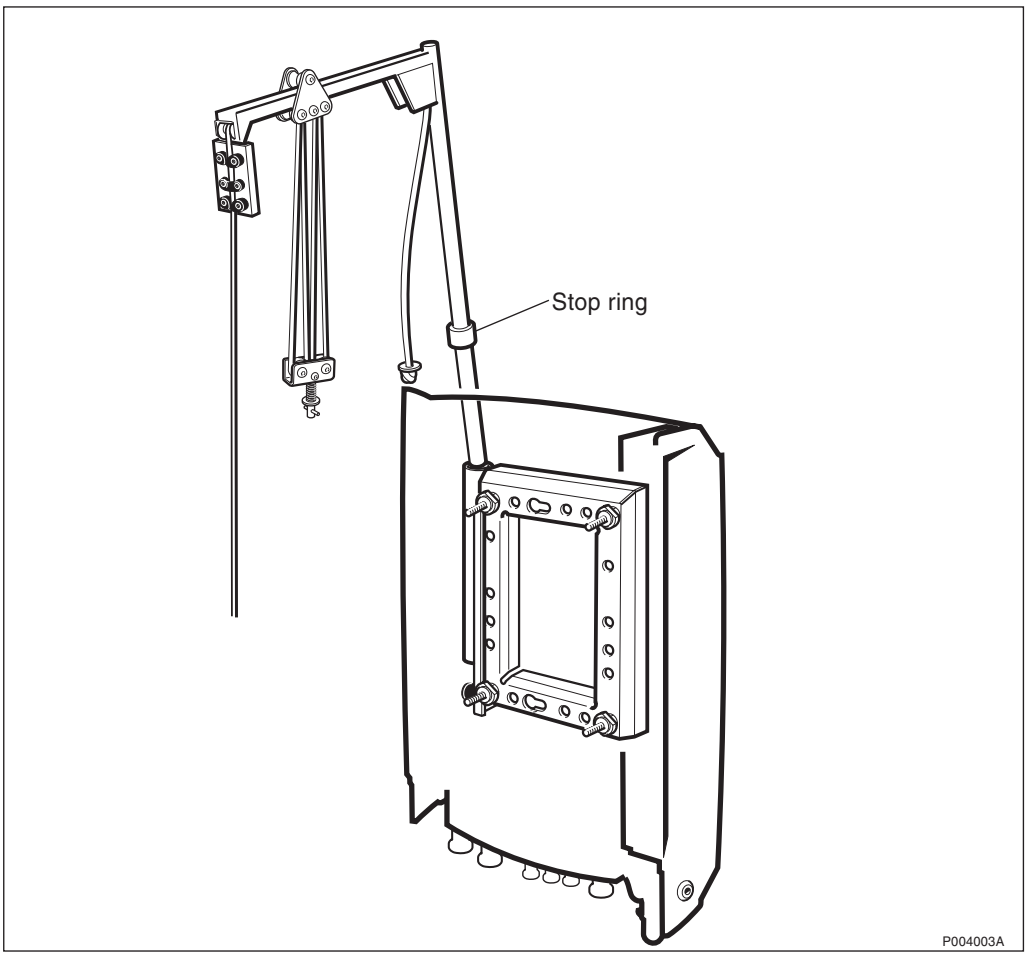

Figure 129 Inserting the lifting device in the tube-bracket

7. Insert the lifting device in the tube bracket. The stop-ring on the lifting device must have contact with the tube bracket.

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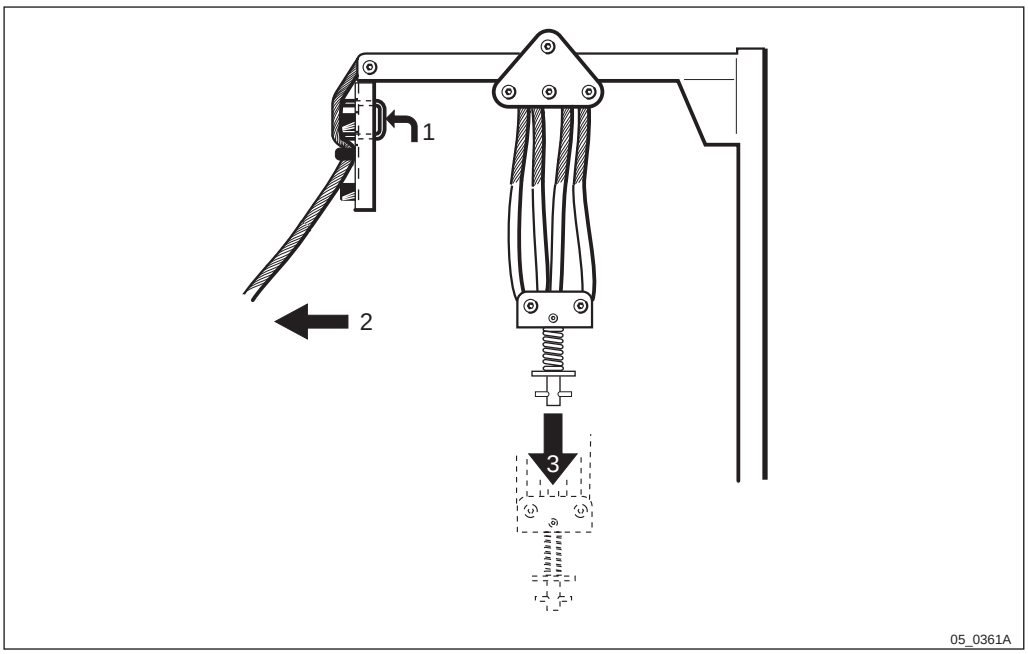

Figure 130 Loosening the rope

8. Loosen the rope from the upper cleat by first pressing up the release lever and at the same time pushing it against the rope.
9. Lower the hook by loosening the rope from the lower cleat.

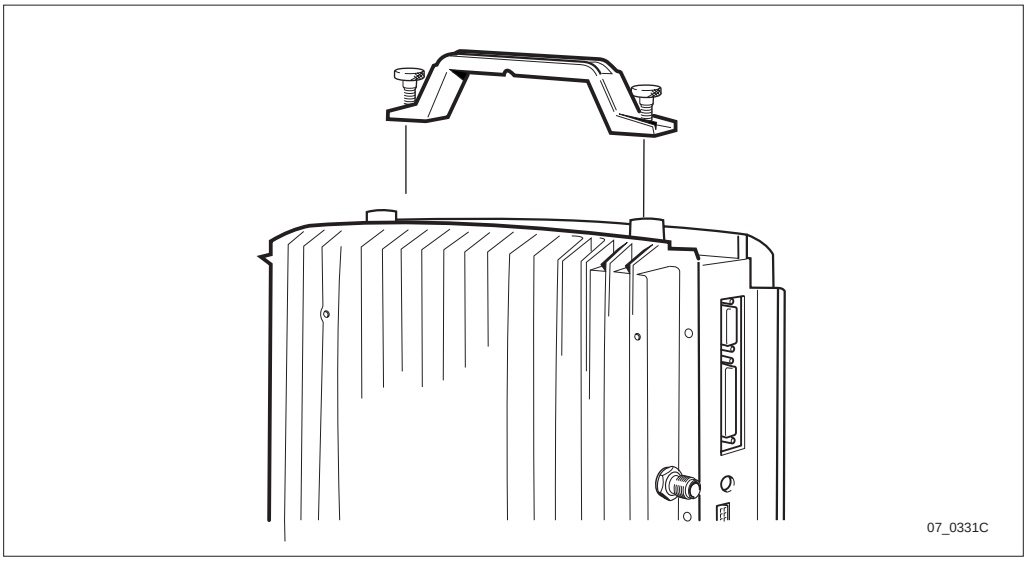

Figure 131 Mounting the handle

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10. Mount the lifting handle on the cabinet.

WARNING

If a cabinet shall be dismounted, hold the lifting rope in one hand, before the cabinet is released from the mounting base. Automatic break not in operation.

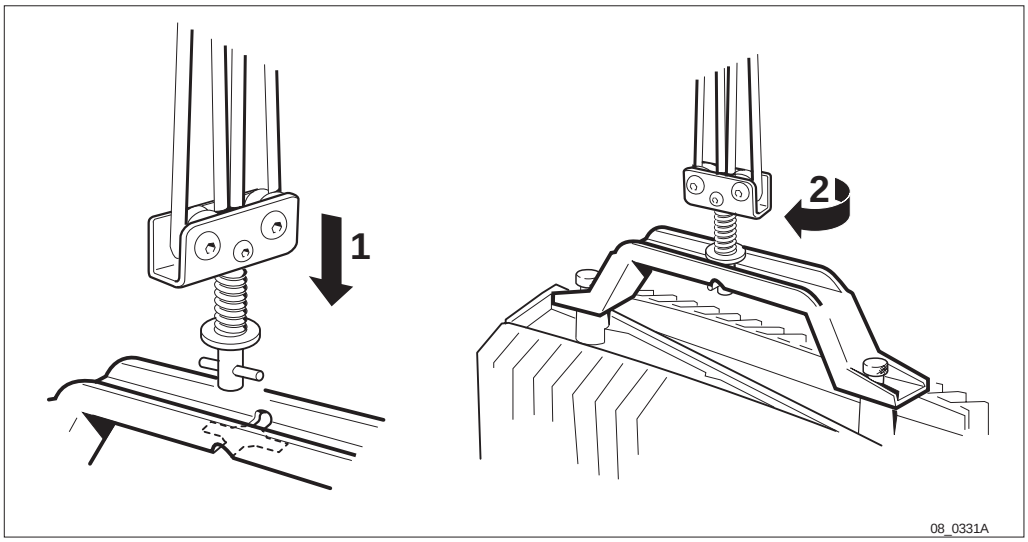

Figure 132 Securing the hook

11. Insert the hook and secure by turning 90°. Make sure that the hook is in the right position.

    If a PBC is to be lifted, make sure that the batteries are removed from the cabinet.

12. Hoist the cabinet to the same level as the rear sun-shield.

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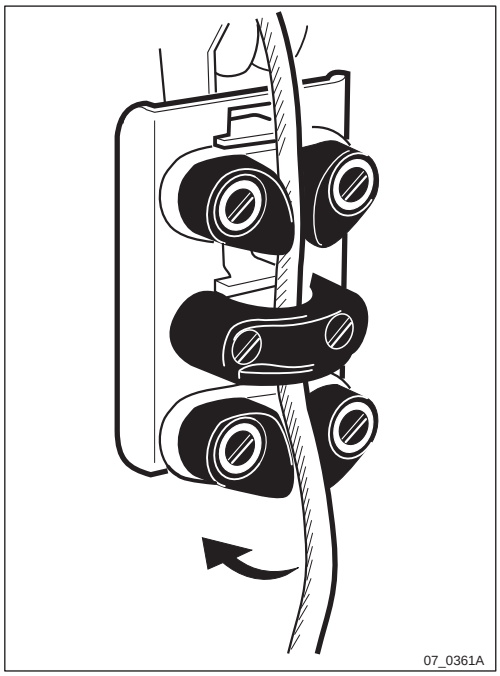

Figure 133 Fastening the rope

13. Fasten the rope in the lower cleat.

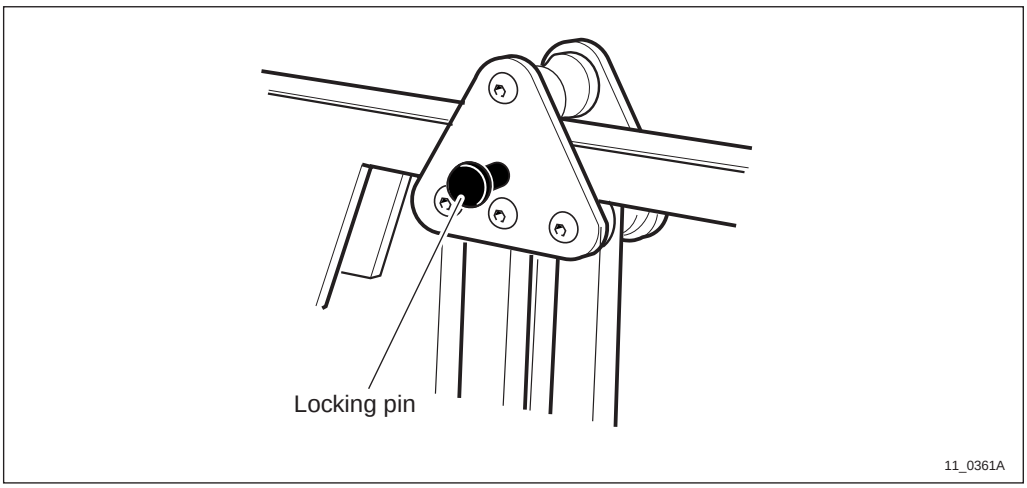

Figure 134 Releasing the trolley

14. Release the trolley by pulling out the locking pin.

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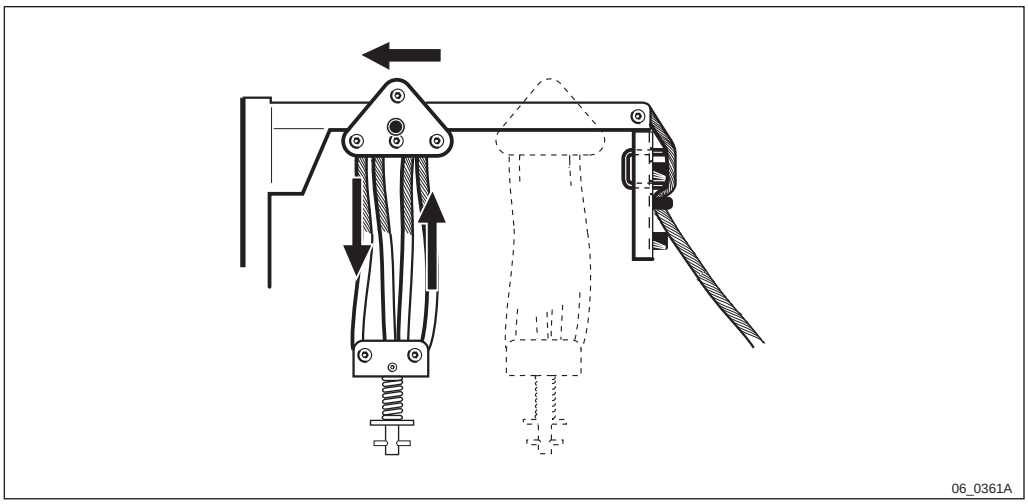

Figure 135 Moving the trolley

15. Move the trolley towards the mounting base by pulling the inner rope part down and the outer rope part up.

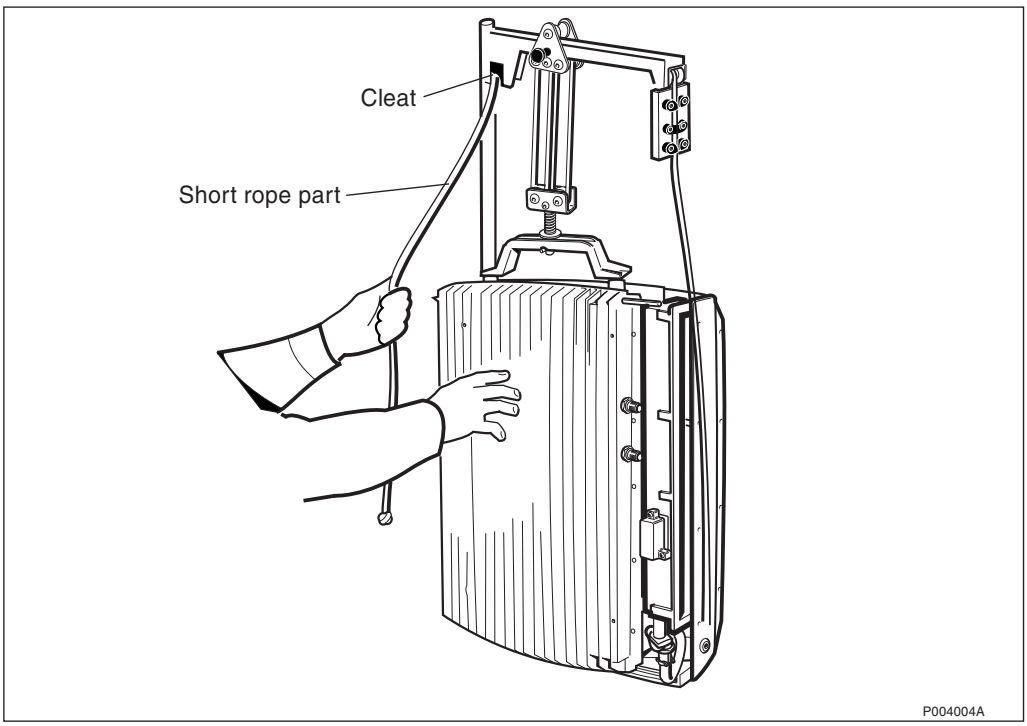

Figure 136 Adjusting the height

16. Loosen the inner rope part from the cleat and adjust the height.

17. Continue with the instructions from *step 2 on page 106*and on, in *Section 5.12 on page 104*.

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6 Installation of Power and Battery Cabinet

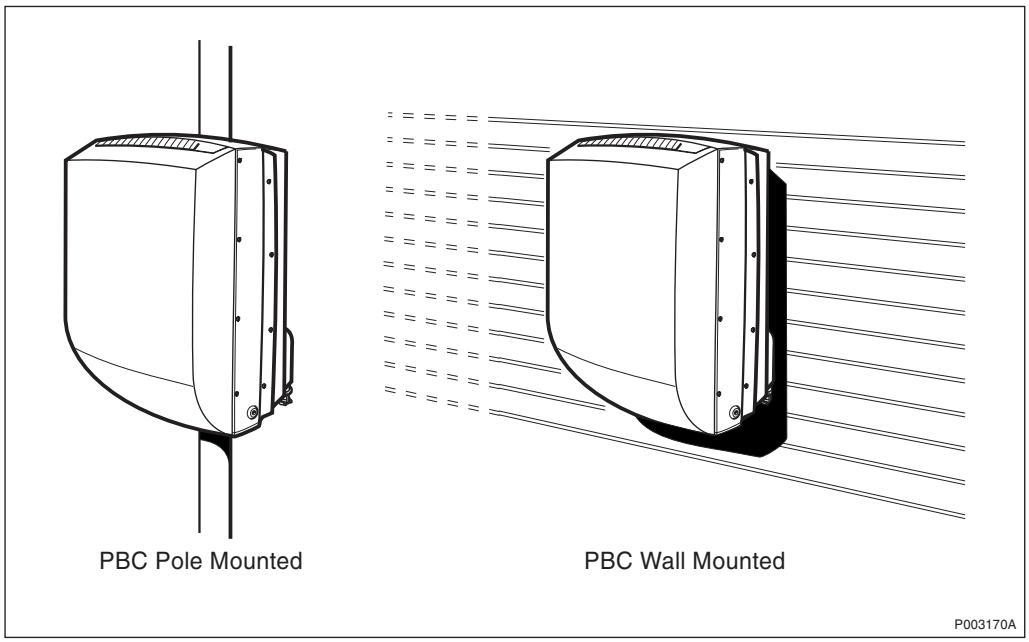

Figure 137 Installation alternatives

6.1 Competence requirement

In order to do installation work according to this manual in a safe and professional way, the work shall be done by skilled personnel.

The following qualifications are minimum requirements:

- Good understanding of radio and telephone engineering.
- Good understanding of engineering English.

6.2 Preconditions

Ensure that the following conditions are met:

- Site access permission received.
- Ordered PBC, equipment, specified tools and other necessary facilities have been delivered.
- Electrical ducting is ready and AC mains power is available.
- Earth Point is available.
- During bad weather conditions it may be necessary to protect the cabinet during installation.
- When the cabinet is mounted outdoors, it must not be left without power for more than 48 hours. This requirement is caused by the risk of humidity damages.
- Always use an approved antistatic bracelet to avoid damage to components mounted on printed board assemblies.

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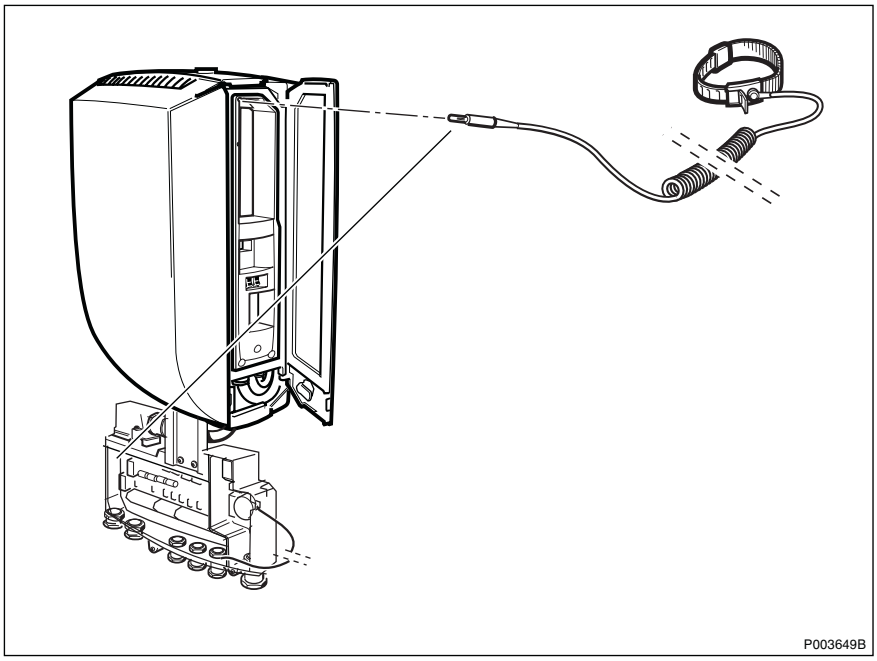

Figure 138 Connecting the ESD wrist strap

6.2.1 Preconditions for wall-mounted PBC

- Make sure that the selected bolt is suitable for the type of wall material that the cabinet is to be mounted on.
- Make sure that the wall surface is even.

6.2.2 Preconditions for pole-mounted PBC

- The pole must have the required dimension (60–114 mm in diameter).

6.2.3 Documents

Ensure that the following documents are available:

- Filled in and approved record prepared during site preparation.
- Site installation documentation prepared by the Installation Engineering Department.

General Installation Instructions *LZN 302 49*

6.2.4 Tools and Instruments

The tools needed for Power and Battery Cabinet installation may be found in *chapter Tools and Instruments*.

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Table 8 Recommended Torque

Dimension	**Torque**				**Notes**
	Ncm	Nm	lbf-in	lbf-ft	
M3	110 +/- 7	-	9.7 +/- 0.6	-	
M3	80 +/- 7	-	7.1 +/- 0.6	-	Reduced for plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	190 +/- 15	-	16.8 +/- 1.3	-	Reduced for plastic covers
M5	540 +/- 30	-	47.8 +/- 2.6	-	Battery poles for battery cabinet
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	

6.3 Overview

The recommended installation procedure includes the following activities:

- Unpack and verify against the packing list that the correct material has been delivered.
- Mount the PBC mounting plate.
- Mount the PBC mounting base.
- Connect earth and lightning protection.
- Connect the external cables.
- Mount the cabinet.
- Connect internal cables.
- Install the batteries.
- Mount the sunshields.

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6.4 Unpacking

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

In order to avoid damages to components due to electrostatic discharges during unpacking, make sure not to come in contact with the connectors on the cabinet

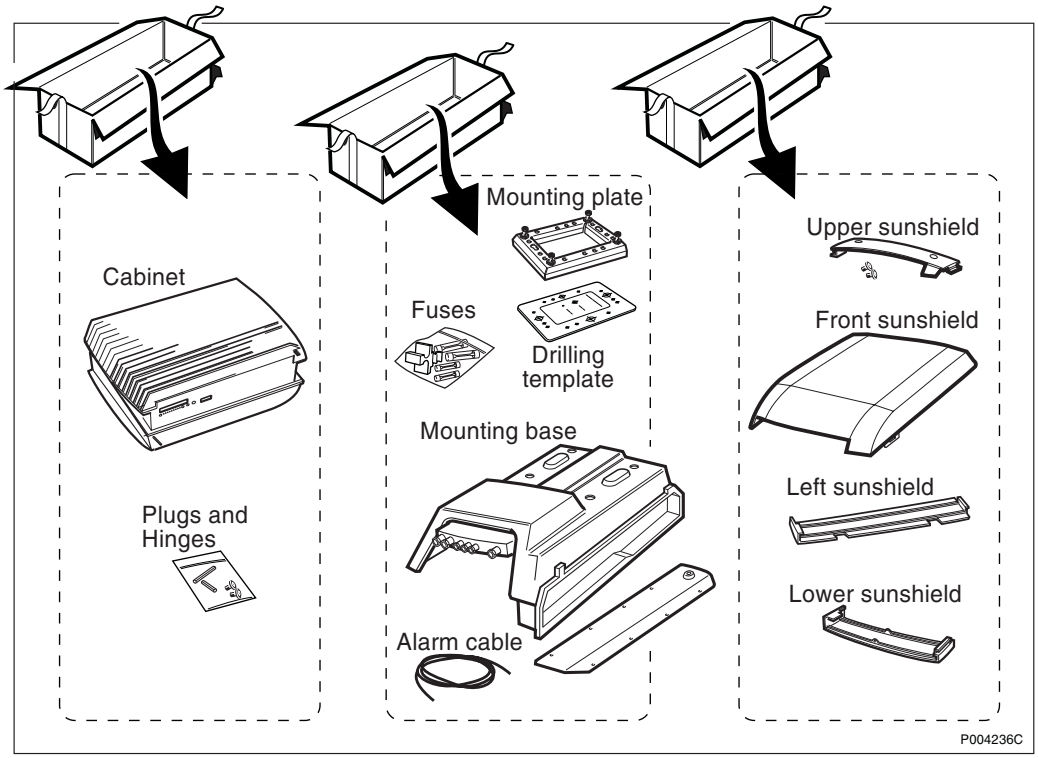

Figure 139 Unpacking the cabinet, mounting base and sunshields

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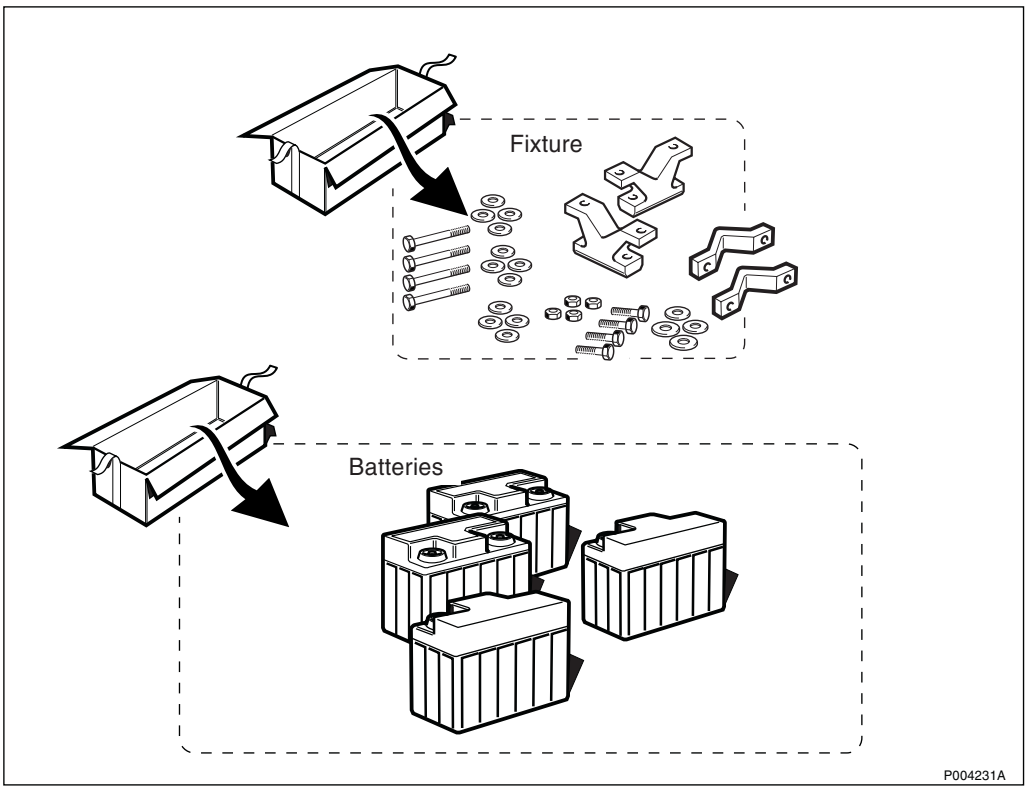

Figure 140 Unpacking the optionals

Unpack and ensure that the correct material has been delivered. If the material is damaged make an immediate complaint to the supervisor/ transport company.

6.5 Mounting the Mounting Plate

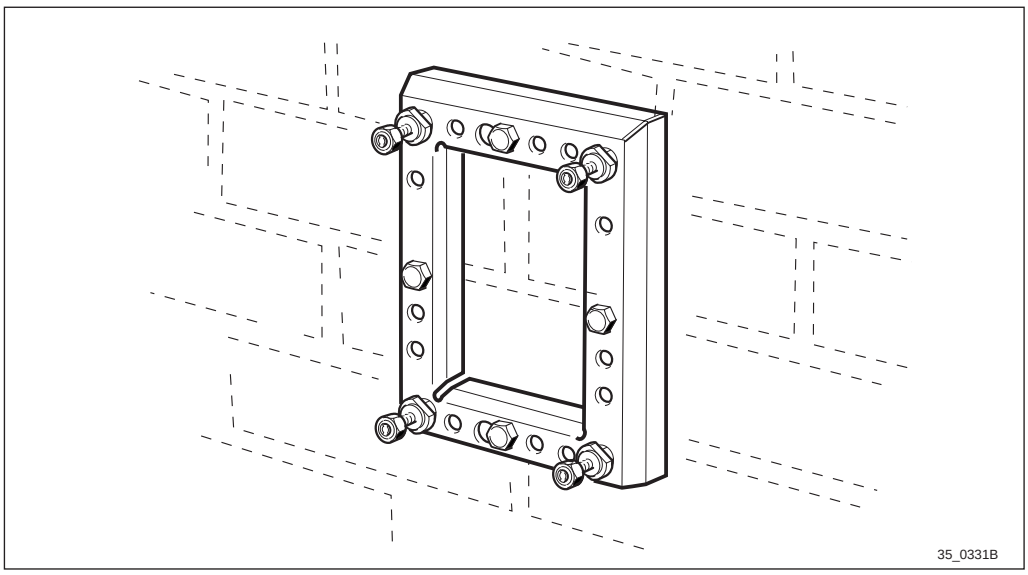

Figure 141 Mounting the mounting plate

If the installation site is at such height that work cannot be done without aid, a skylift or scaffold must be used. For safety reasons, a step ladder should only be used as an exception.

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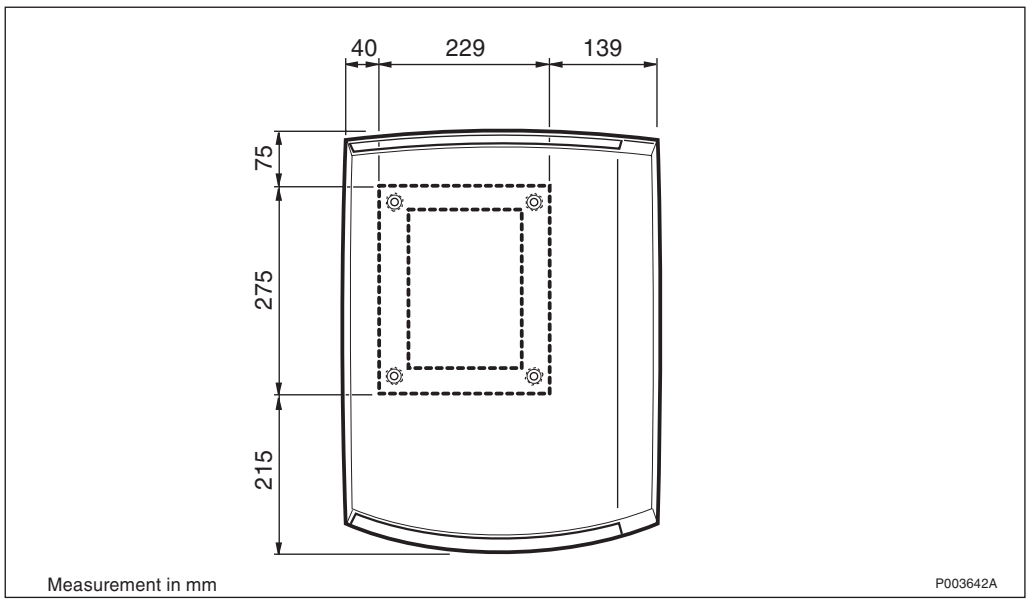

Figure 142 Mounting plate and equipment contour, front view

Figure 142 on page 144 shows the dimensions of the equipment in relation to the mounting plate. This is to determine a suitable alignment with several units or existing equipment. For more information *see chapter Product Data* and *chapter Site Planning and Requirements*.

6.5.1 Mounting the Mounting Plate on a Wall

1. Place the mounting plate drilling template in the position where the PBC is to be situated.

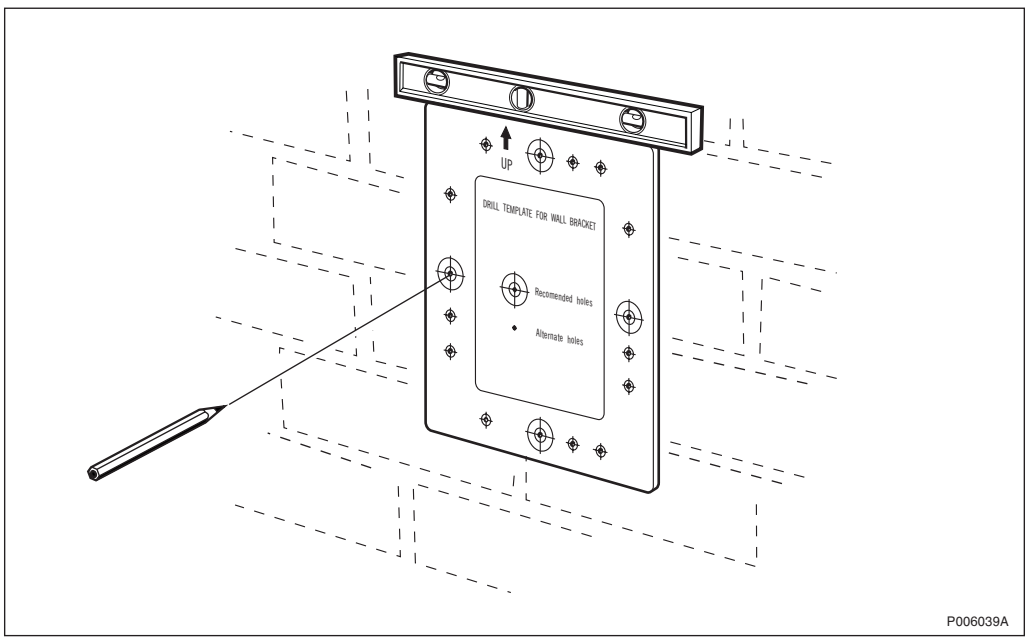

Figure 143 Marking the holes

2. Check with a spiritlevel that the drilling template is placed in a horizontal position.
3. Use a pen to mark the position of the holes that are to be drilled.

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4. Remove the template and drill the holes for the fasteners best suited for the wall material.

Note: The mounting plate must not be used as a drilling template in order not to damage the rust protection surface.

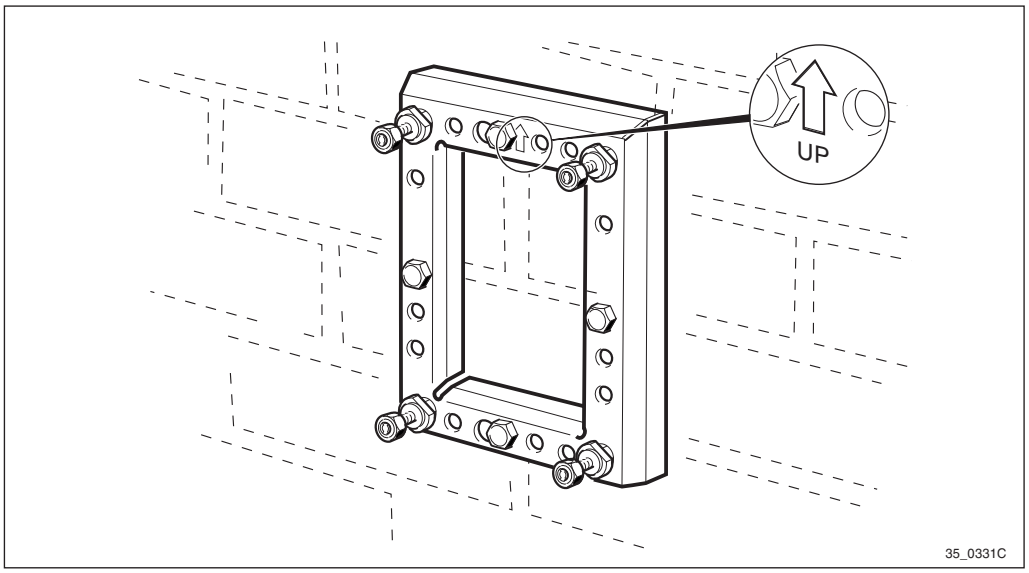

Figure 144 Mounting plate

5. Mount the mounting plate and secure it into position with all screws.

6. Unscrew the four nuts on which the mounting base is to be hung, until only a few threads remain.

6.5.2 Mounting the Mounting Plate on a Pole

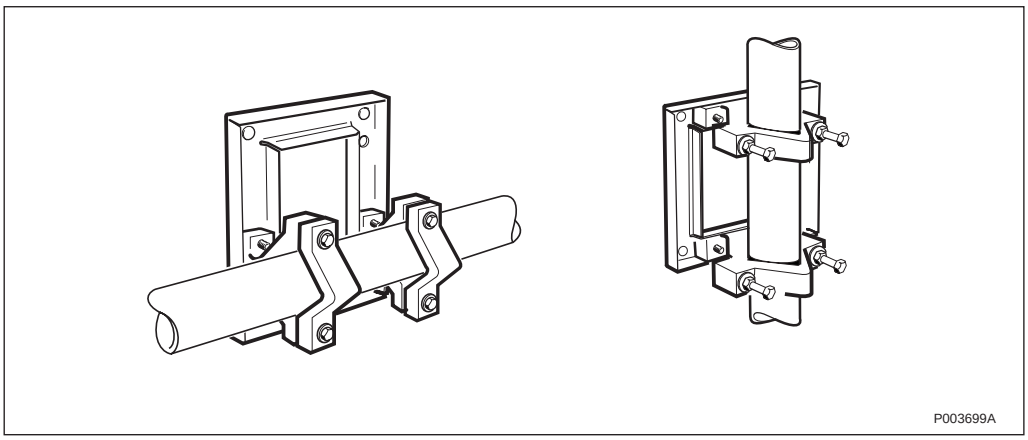

Figure 145 Mounting alternatives

The mounting plate may be mounted on a vertical or a horizontal pole by using different holes.

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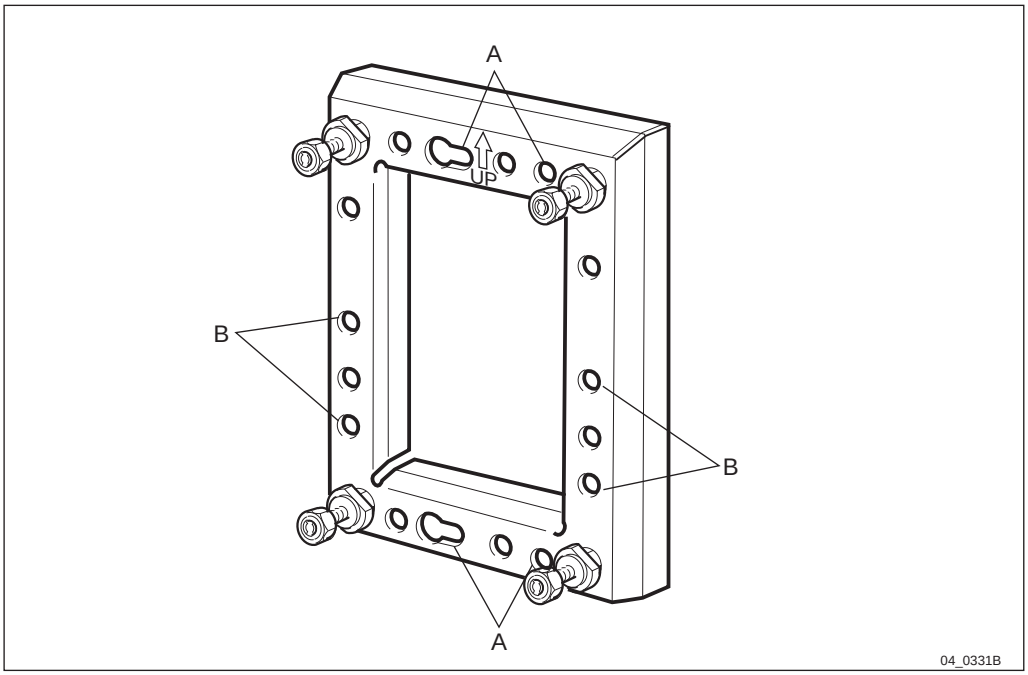

Figure 146 Choosing the appropriate holes

A Holes to be used for vertical pole

B Holes to be used for horizontal pole

1. Choose the appropriate holes (horizontal/vertical).

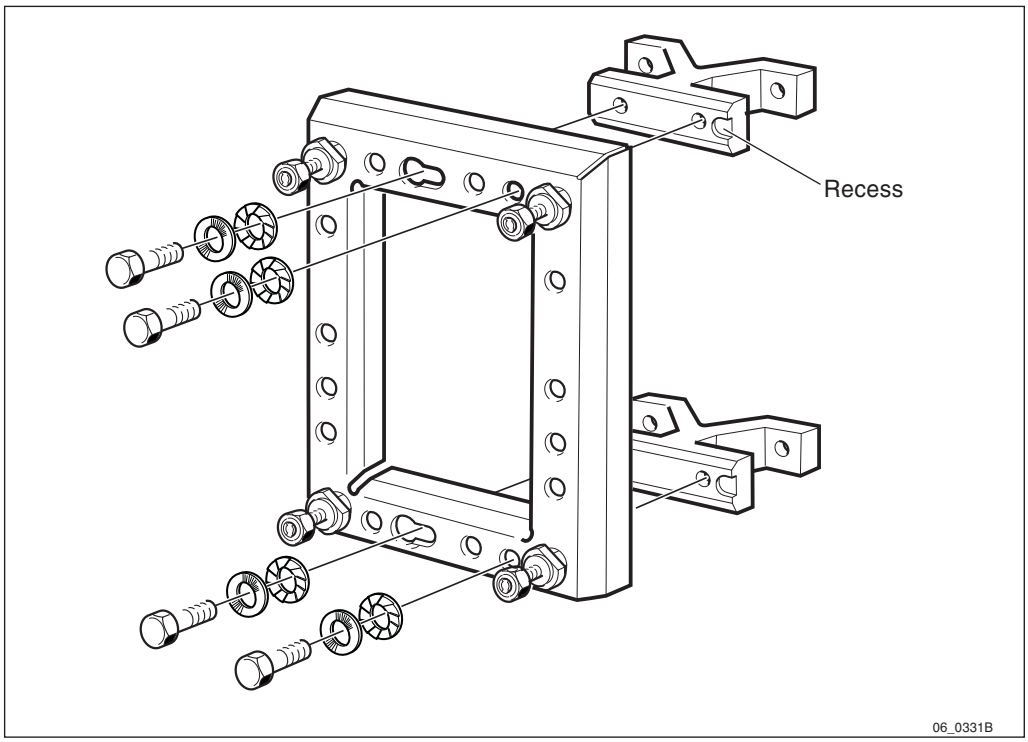

Figure 147 Fastening the clamps and mounting the washers

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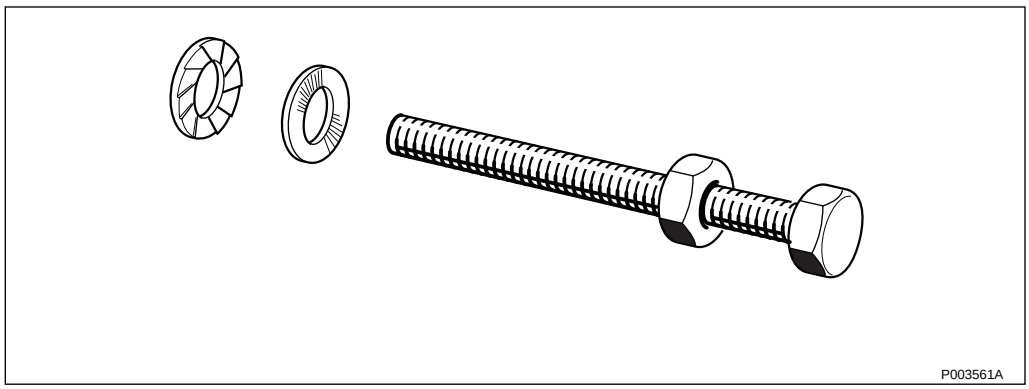

Figure 148 Mounting the washers

2. Make sure that the washers are mounted correctly, *see Figure 148 on page 147*.

3. Fasten the two clamps with the screws and washers. Ensure that the recess is attached at the correct place.

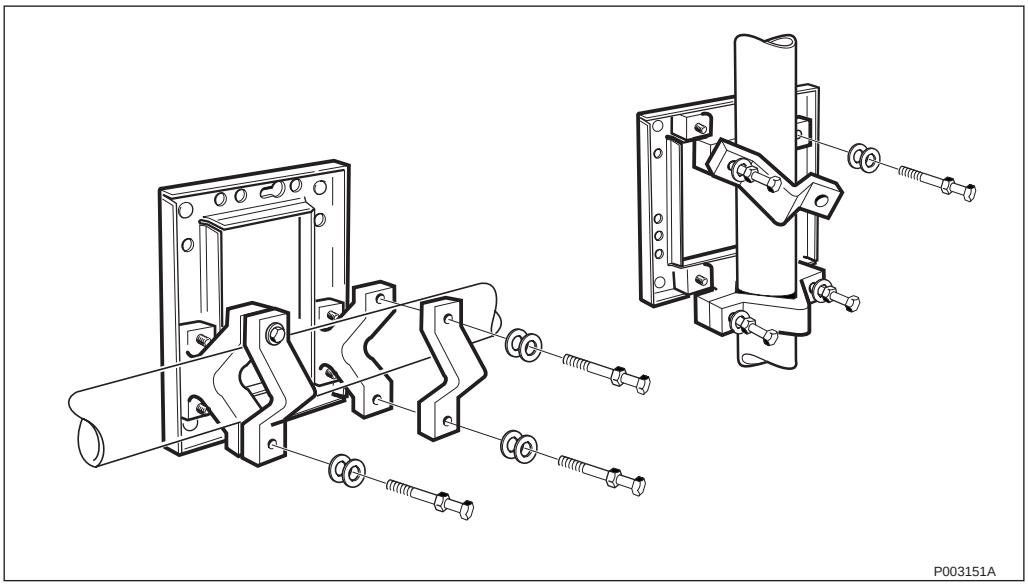

Figure 149 Placing the mounting plate correctly

4. Place the mounting base at the correct height on the pole and mount the clamp halves.

5. Make sure that the washers are mounted correctly, *see Figure 148 on page 147*.

6. Mount the screws and tighten them alternately (right and left side) in order to avoid bending the screws.

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6.6 Mounting the Mounting Base

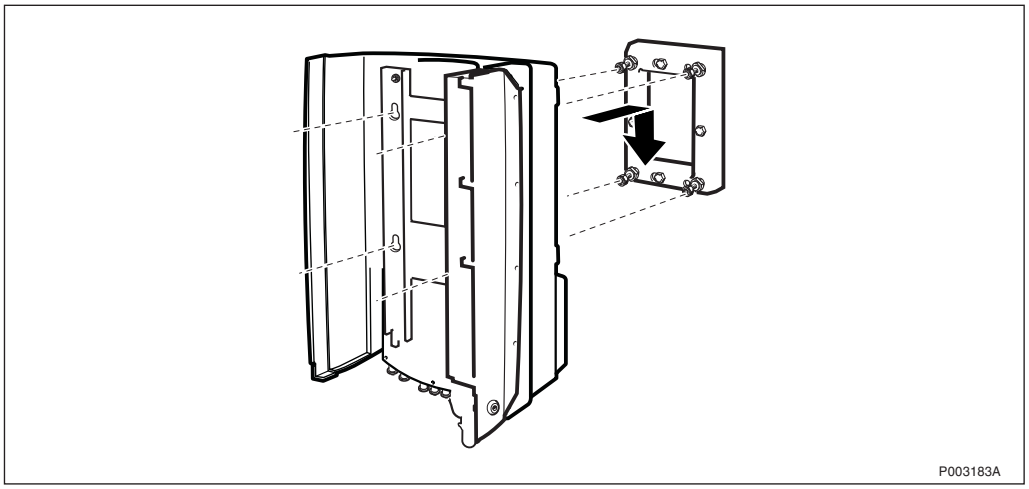

Figure 150 Mounting the mounting base on the mounting plate

1. Mount the mounting base on the four screws situated on the mounting plate. Ensure that the fastening screws are properly fitted in the key holes.

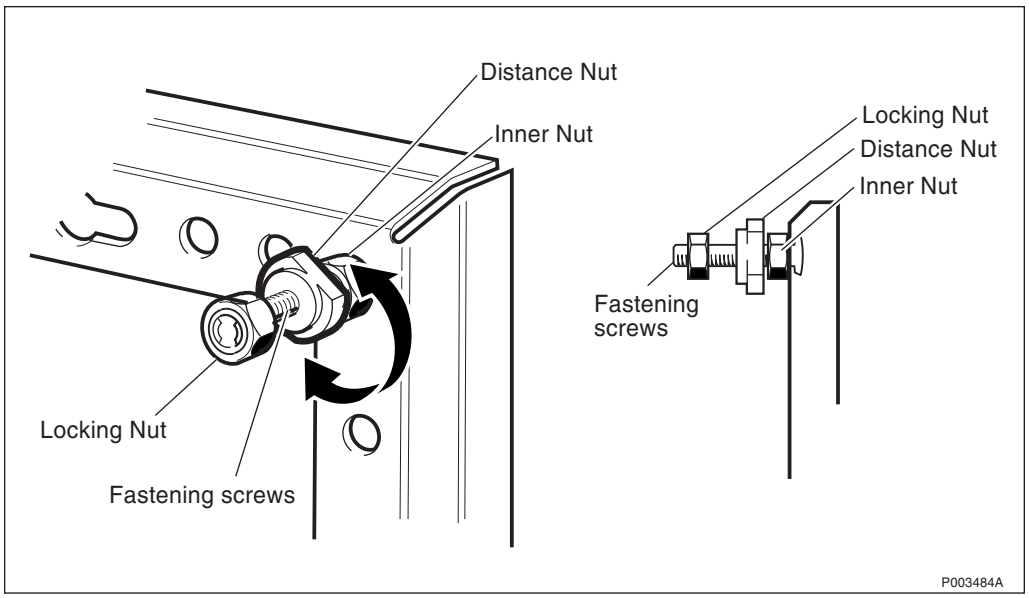

Figure 151 Adjusting the distance nuts

2. Alter the vertical inclination of the mounting base relative to the mounting plate, by adjusting the four distance nuts. This can only be done with the mounting base dismounted. The locking nuts may remain on the fastening screws.

Note: Do not loosen the inner nuts. The locking nuts secure the bolts in the mounting plate.

3. When the mounting base is correctly adjusted, tighten the four locking nuts.

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6.7 Mounting the Installation Box Door

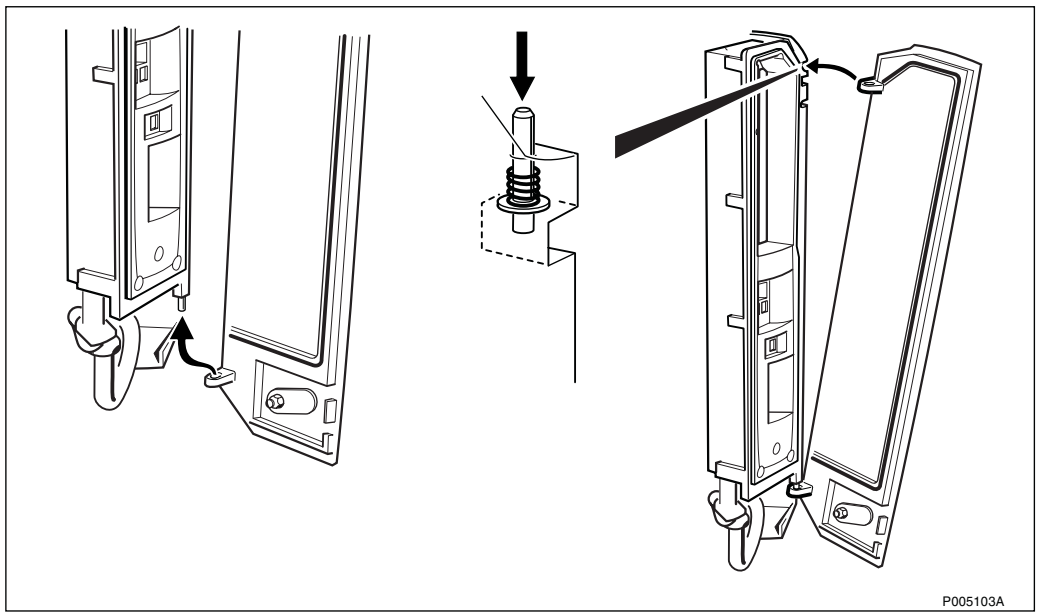

Figure 152 Mounting the installation box door

1. Hook the lower left hand corner of the door on to the installation box.
2. Press down the spring locking pin on the upper right hand corner of the installation box.
3. Insert the installation box door by pushing the upper left hand corner of the door into position. Make sure that the spring locking pin snaps into position.

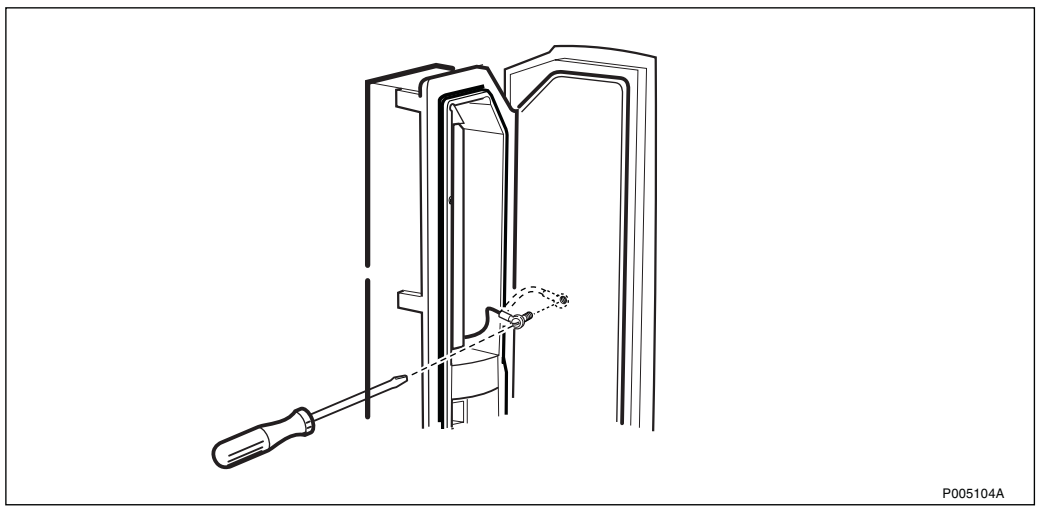

Figure 153 Mounting the earth cable

4. Mount the earth cable on the installation box door by screwing the torx screw into position.

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6.8 Installation Box

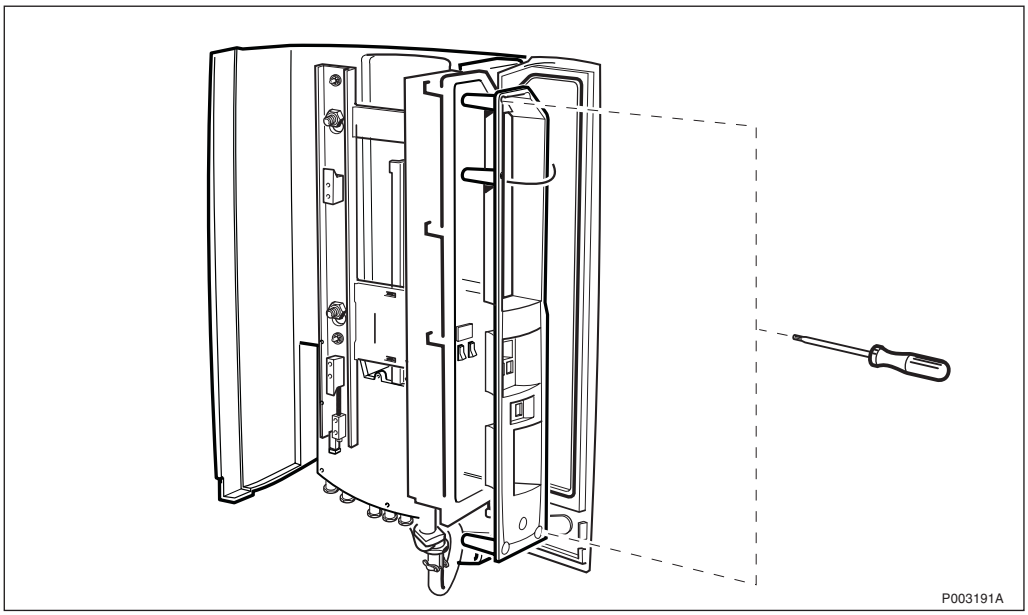

Figure 154 Removing the protection cover

1. Remove the protection cover by unscrewing the 2 torx screws and let the cover hang in the earth wire.

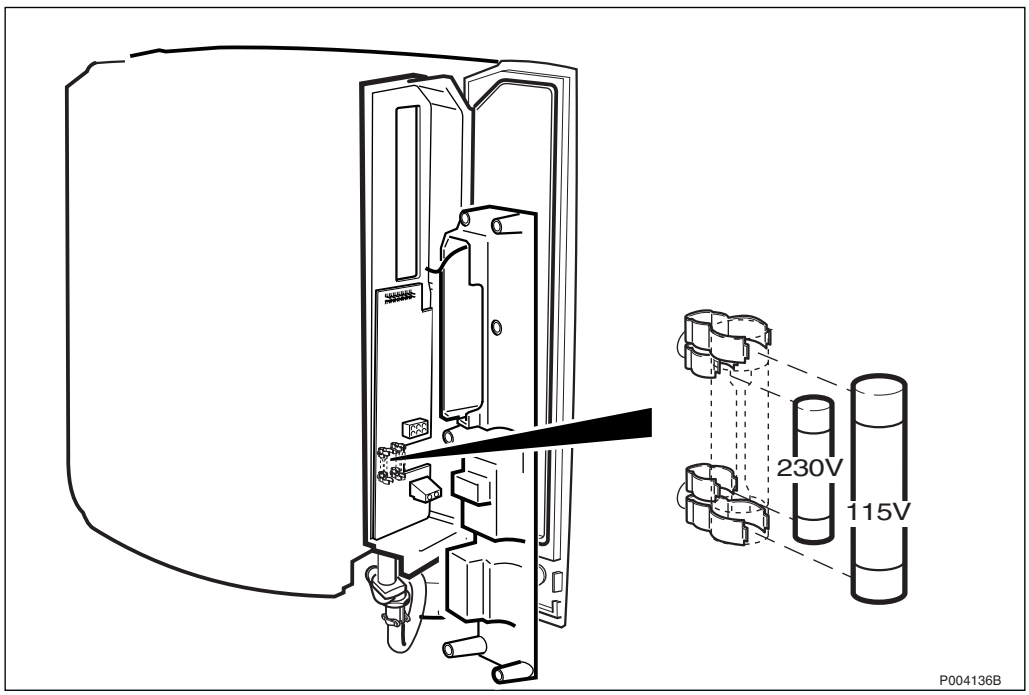

Figure 155 Installing the fuses

2. Install the recommended fuses.

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Table 9

Voltage	Fuses Data	Dimension
100-127 V AC	Ceramic Slow Blow 8 AT, 250 V(1)	6.3x32 mm
200-250 V AC	Ceramic Slow Blow 4 AT, 250 V(1)	5x20 mm

(1) Fuse according to standard EN 60127

6.9 Connecting Earth and Lightning Protection

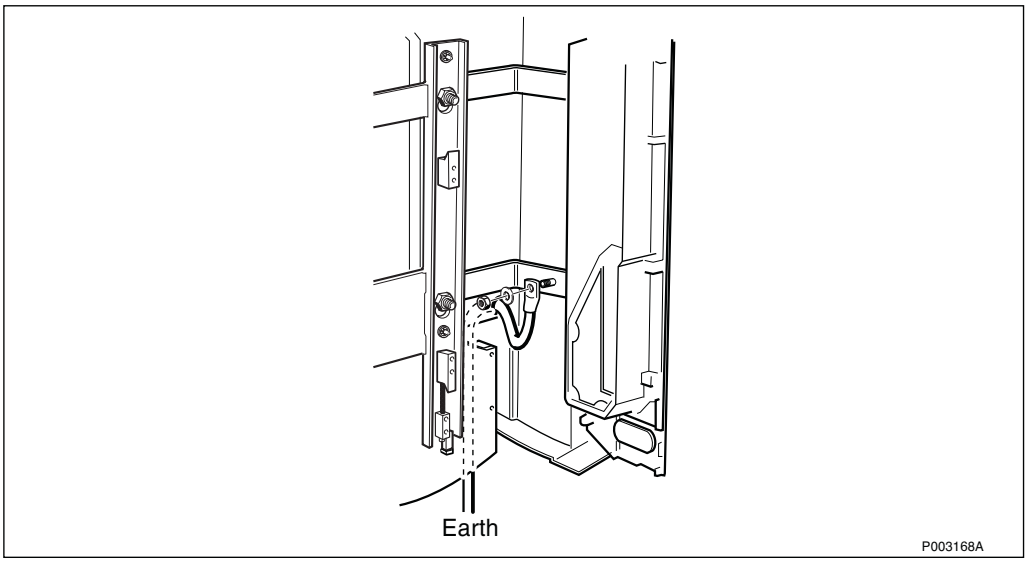

Figure 156 Connecting earth and lightning protection

If the site is located outdoors and is not protected from lightning by a house equipped with a lightning protection system, protect the equipment as follows:

1. Guide the earth cable through the cable inlet down right at the bottom of the rear sunshield.
2. Connect the earth cable on the mounting base. Use earthing kit, see:

General Installation Instructions *LZN 302 49*

3. Connect the other end of the earth cable to the existing lightning system close to the equipment.

Note: If there is no lightning protection system, use the earthing bar, see:

General Installation Instructions *LZN 302 49*

6.10 Connecting External Cables

This section describes the connections to the PBC.

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6.10.1 Opening the Interface Box

Before the connection procedure can begin the interface face box has to be opened.

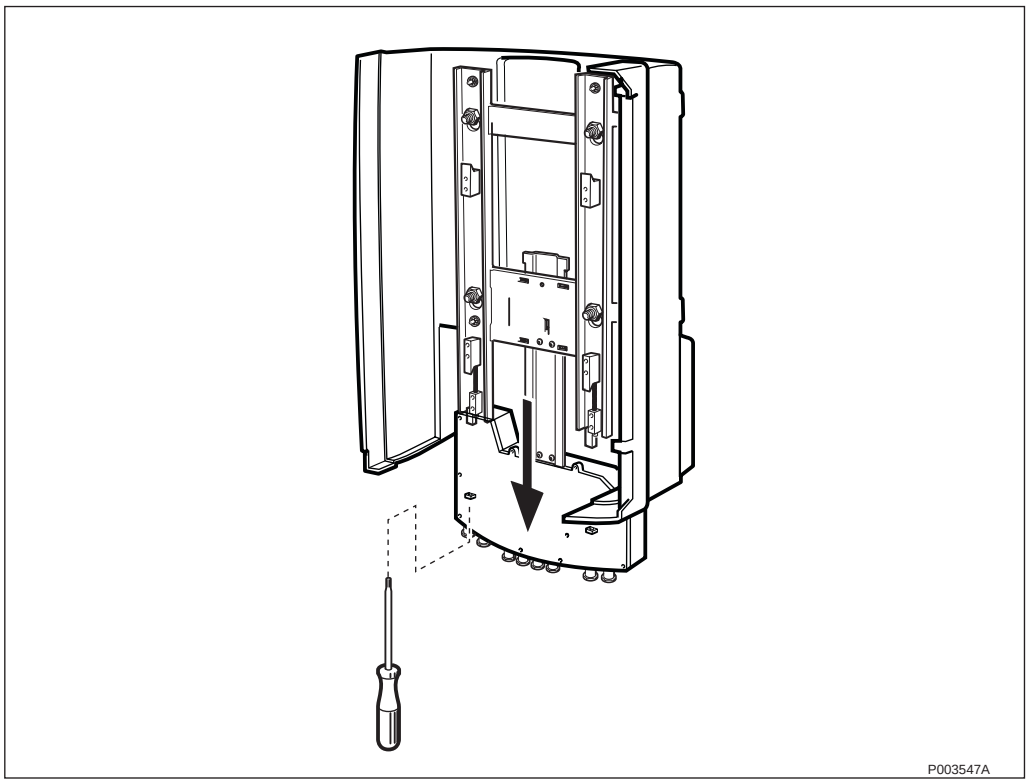

Figure 157 Pulling down the interface box

1. Loosen the screws securing the interface box placed underneath the RBS and pull down the interface box.

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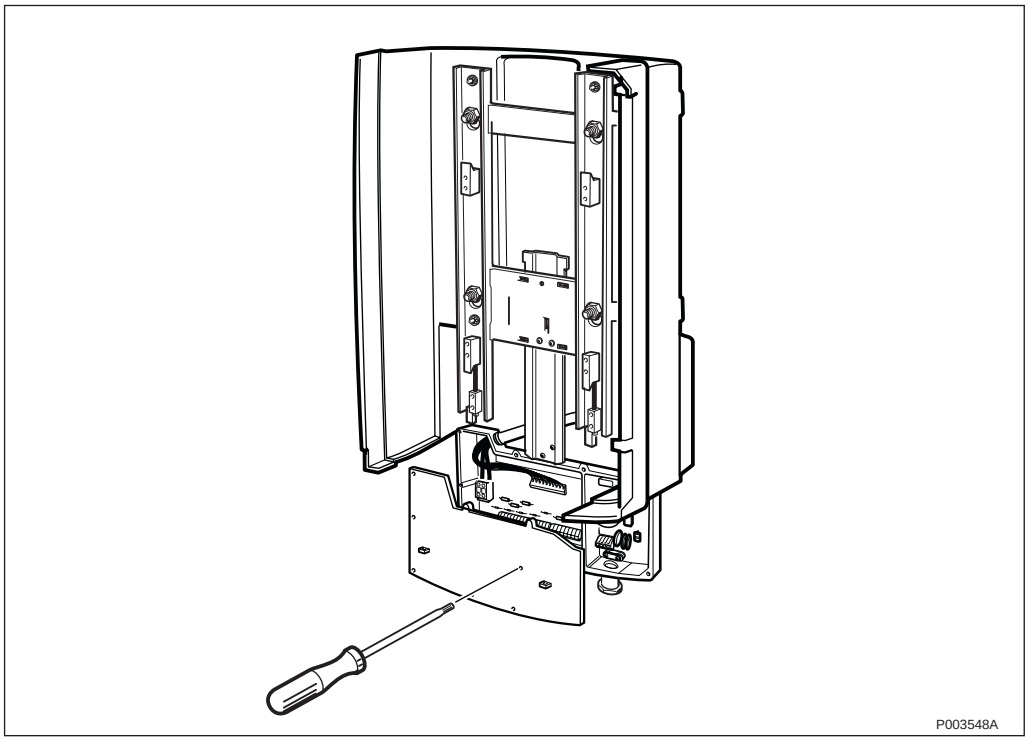

Figure 158 Opening the interface box

2. Unscrew the 9 torx screws on the interface box cover. Let the cover hang in the strap.

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6.10.2 Connection the AC Mains

DANGER

High voltage is used in the operation of this equippment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

DANGER

Improper electrical installation may cause fire or electrical shock. Approved circuit breakers for the AC mains and the cable's cross sectional area must always be selected in accordance with local laws and regulations. Only a qualified and authorized electrician is permitted to install and modify the electrical installation.

Protective Earth

A reliable incoming Protective Earth must be connected to the earth terminal when connecting power supply.

The earth terminal is located in the interface box, indicated by PE and the earth symbol.

Figure 159 Protective Earth

The Protective Earth connection is essential.

Connecting AC

It is not possible to loosen the gland plate for the AC cable from the interface box. Thus the AC cable can not be mounted at ground level.

Follow the procedure below to connect the AC mains power cable.

Note: Make sure the AC Mains is switched off before beginning the AC installation procedure.

1. Route the AC mains cable so the interface box can be pushed up into the cabinet.

If a flexible conduit is to be used, replace the AC mains cable inlet (feed throught) with the flexible conduit and its fastening device, *see Figure 162 on page 156*.

2. Cut the cable to the appropriate length.

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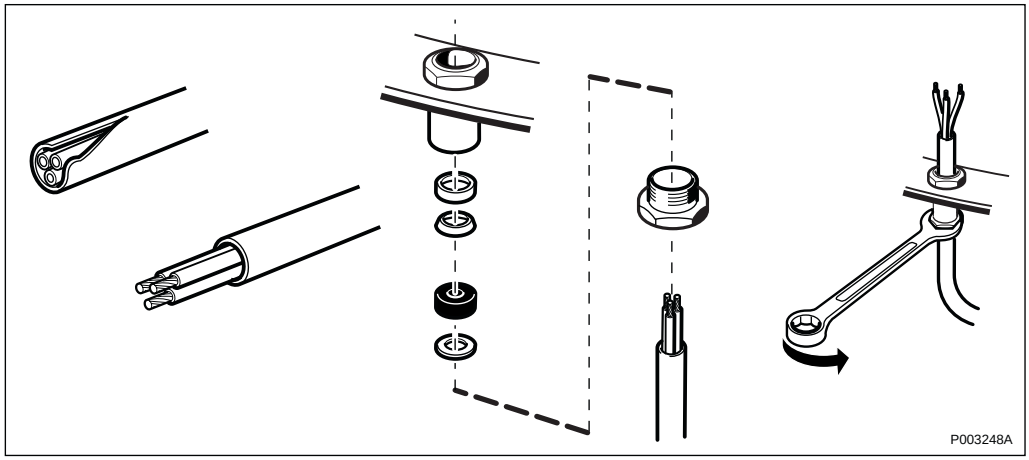

Figure 160 Dismantling and mounting the cable inlet

3. Cut the cable isolation.
4. Adjust the sealing grommet to the cable diameter.
5. Mount all cable inlet details, *see Figure 160 on page 155*.
6. Route the cable into the inlet and tighten the cable gland.

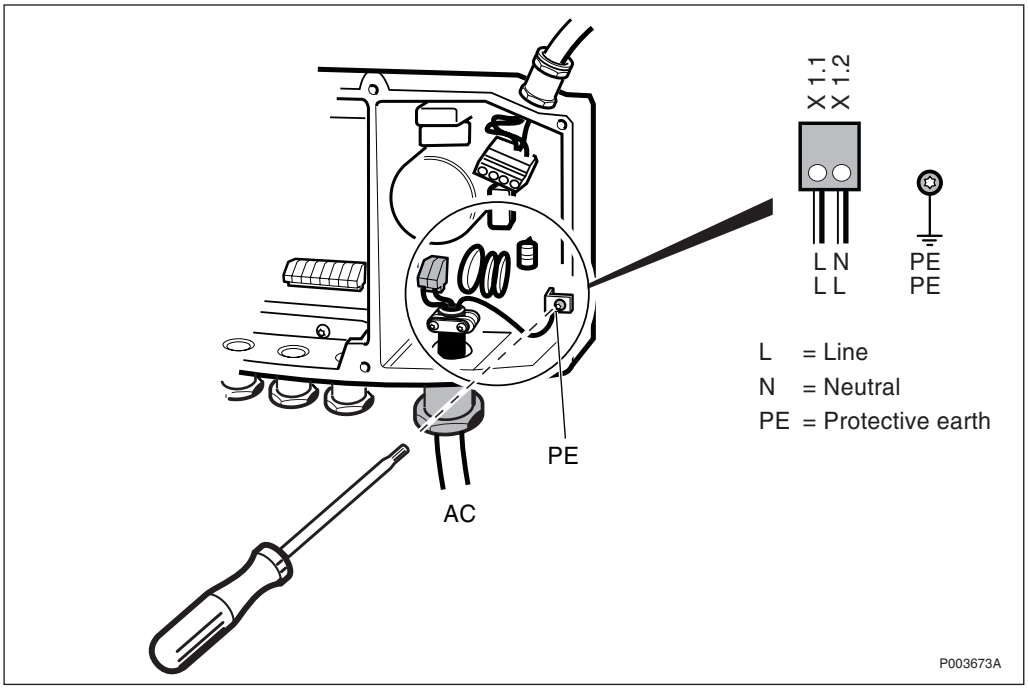

Figure 161 Connecting the AC mains and Protective Earth

7. Connect the AC mains cable.
8. Ensure that the protective earth (PE) is properly connected.

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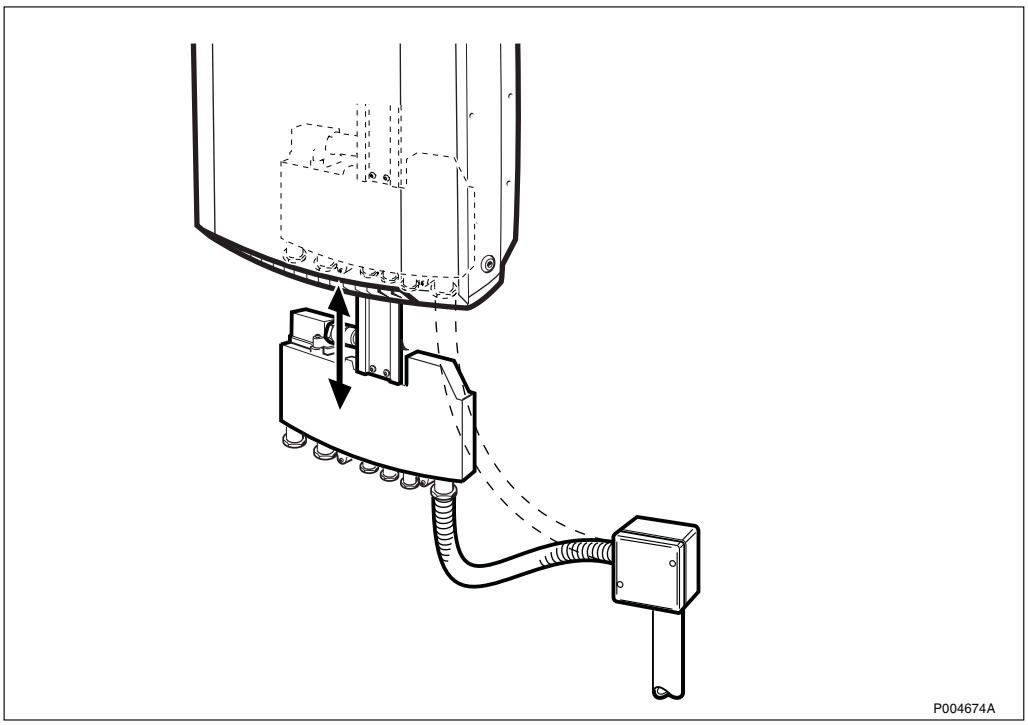

Figure 162 Example of use of flexible conduit

6.10.3 Loosening the Interface Box Gland Plate

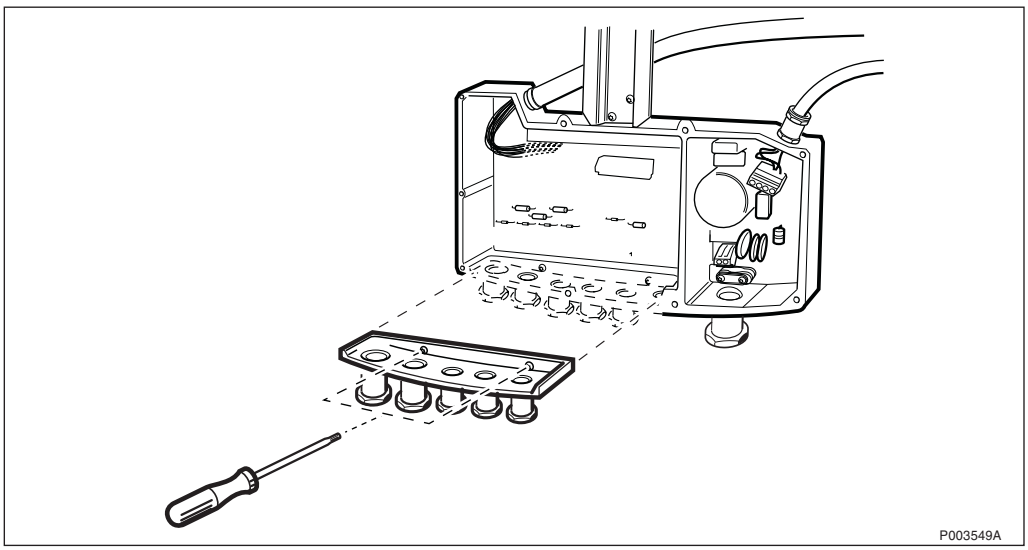

Figure 163 Loosening the gland plate

To simplify the mounting of the cables to the interface box the gland plate may be loosened. This is done by unscrewing the 2 torx screws.

For example is it easier to mount the cable inlet and the cable termination block at ground level instead of at a height, for example on a ladder.

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Loosening the Termination Block

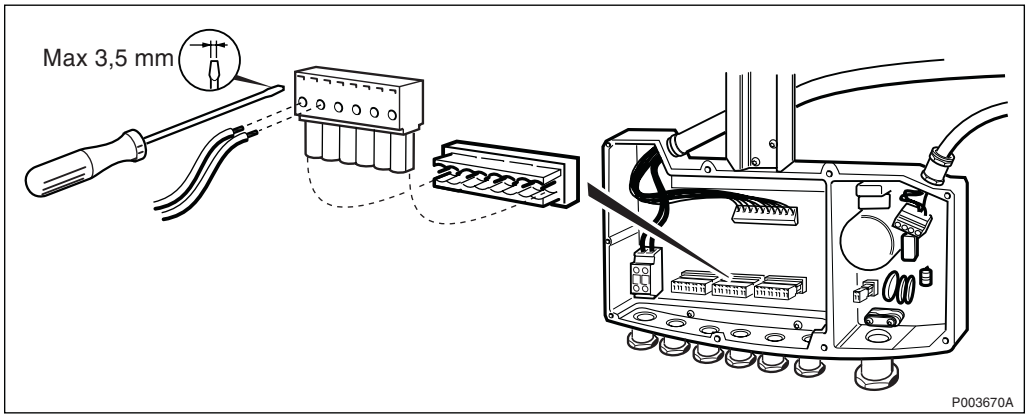

Figure 164 Loosening the termination block

The termination blocks may be loosened to simplify the mounting of the cables.

6.10.4 Assembling the Cable Gland

This section describes the assemling and mounting of the cables that are to be connected to the interface box.

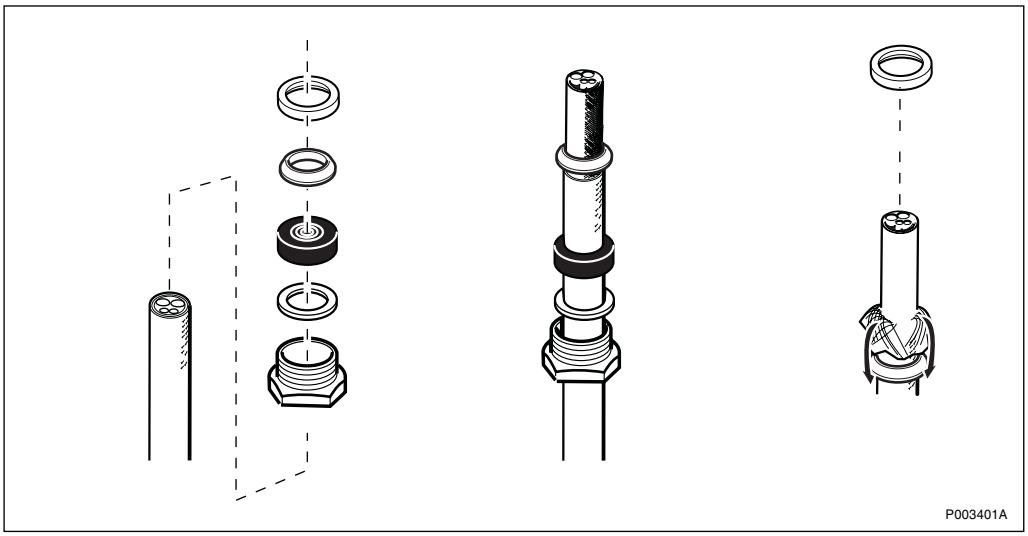

Figure 165 Assembling the cable gland

1. Cut the cables to appropriate length .

Note: Remember to take into account that extra cable length is required so that the interface box can be mounted back into the mounting base.

2. Route the cables so the interface box can be pushed up.
3. Adjust the sealing grommet to the cable diameter.
4. Mount all cable gland details, except for the last clamping cone.
5. Remove the insulation.

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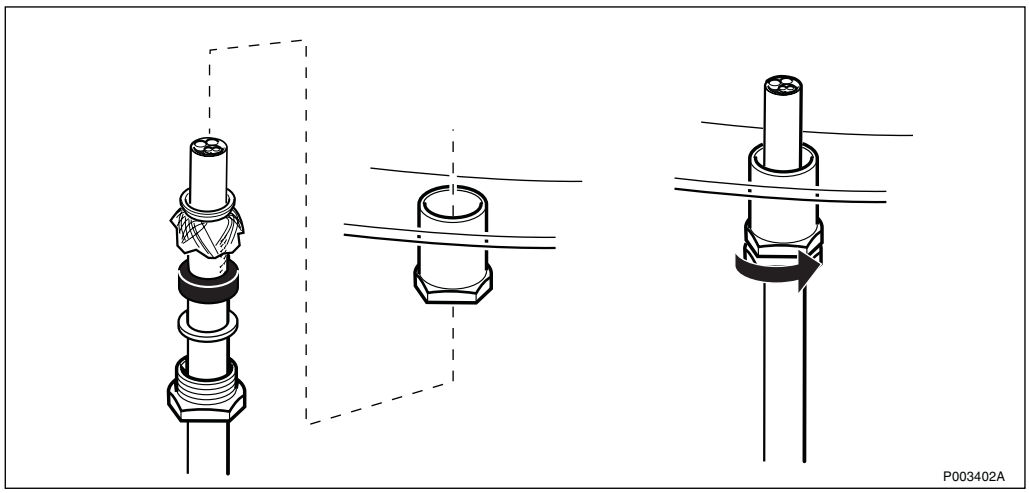

Figure 166 Mounting the cable gland

6. Fold the outer braid.
7. To earth the cable, fit the clamping cone over the cable so that the outer cable braid is squeezed between clamping ring and clamping cone.
8. Route the cable into the inlet and tighten the cable gland.

6.10.5 Connecting the 24 V DC Power Supply Adapter

This is the procedure for connecting the PSA (Power Supply Adapter) 24 V DC backup to the radio cabinet. The cable (5 m) for the PSA is delivered with the PSA.

1. Dismantle the cable and mount the cable inlet, *see Section 6.10.4 Assembling the Cable Gland on page 157*.

DANGER

⚠

Read Safety Instructions regarding handling and connecting batteries.

Note: Make sure the battery switch is in OFF position before working with the battery connection.

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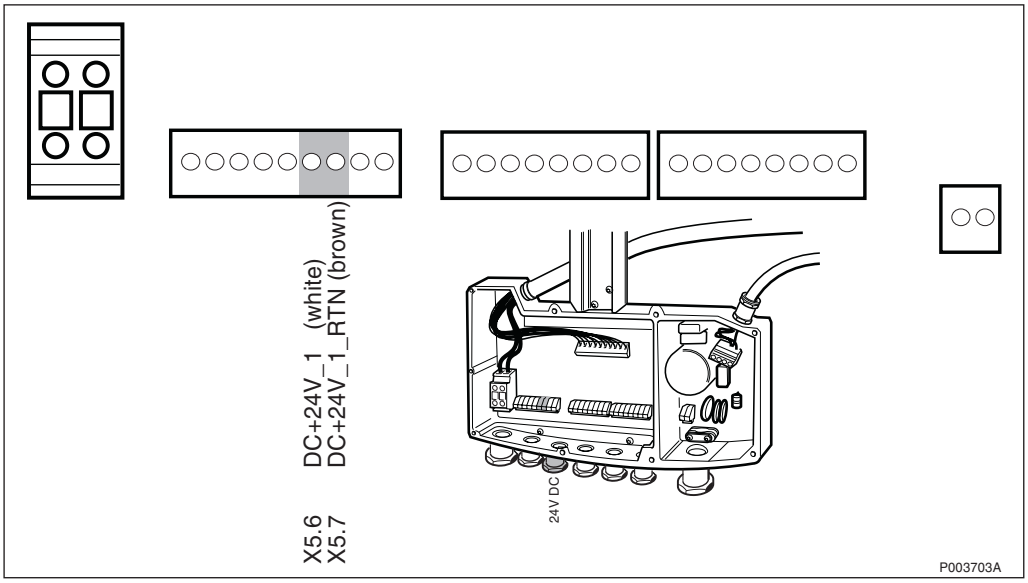

Figure 167 Connecting the 24 V DC Power Supply Adapter

2. Insert the cable wires in to the termination block.

6.10.6 Connecting the Alarm cable

1. Dismantle the cable and mount the cable inlet, *see Section 6.10.4 Assembling the Cable Gland on page 157*.

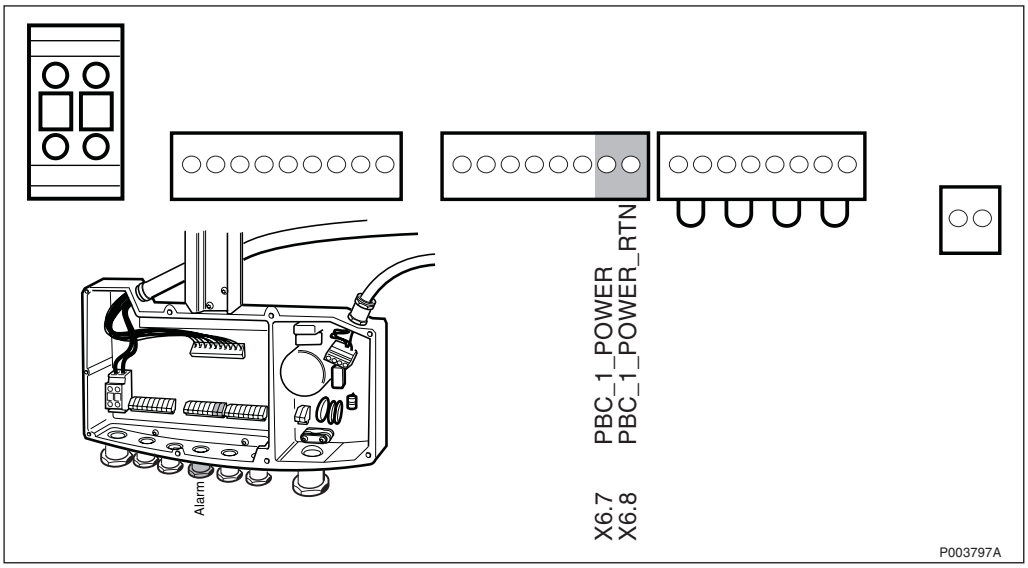

Figure 168 Connecting the alarm cable

2. Insert the cable wires in to the termination block.

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6.10.7 Closing the Interface Box

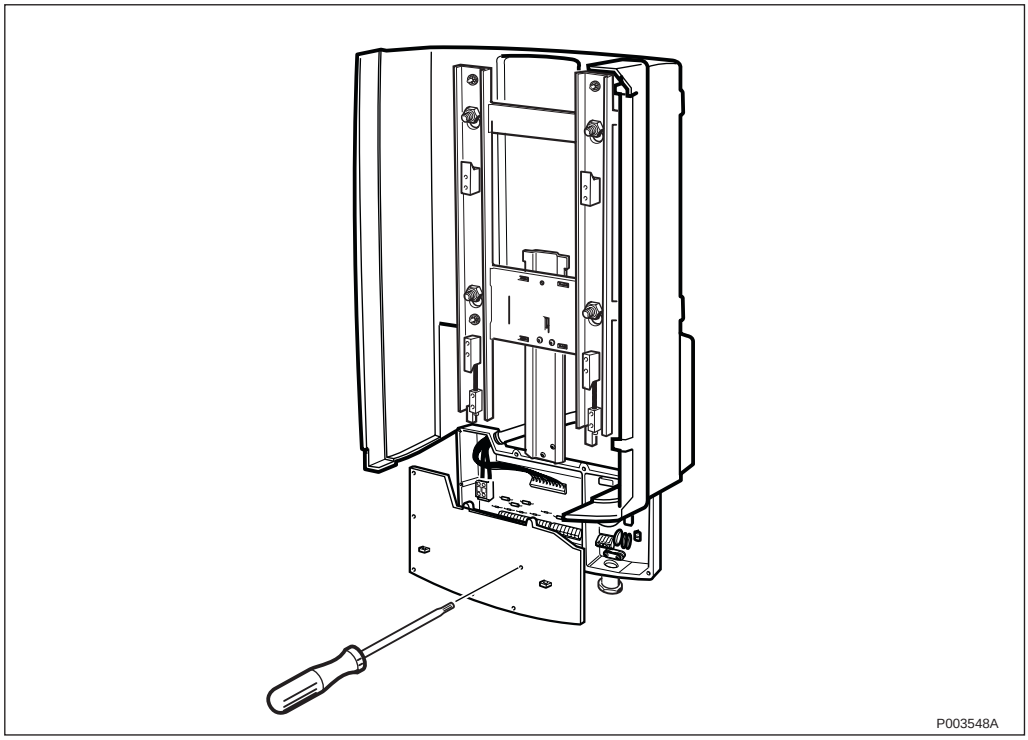

Figure 169 Closing the interface box

1. Remount the interface box cover by screwing the 9 torx screws back into position.
2. Push the interface box upwards and screw the two torx screws situated on the mounting base back into position.

6.11 Mounting the Cabinet

To facilitate mounting, a lifting device may be used, *see chapter Installtion of RBS 2302*.

Note: The lifting device is not dimensioned for lifting the PBC assembled with batteries.

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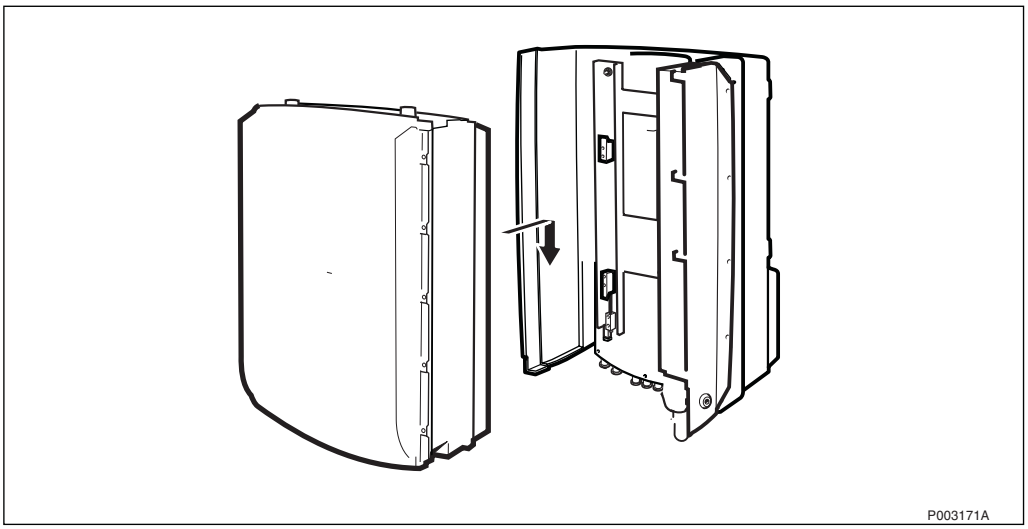

Figure 170 Mounting the cabinet

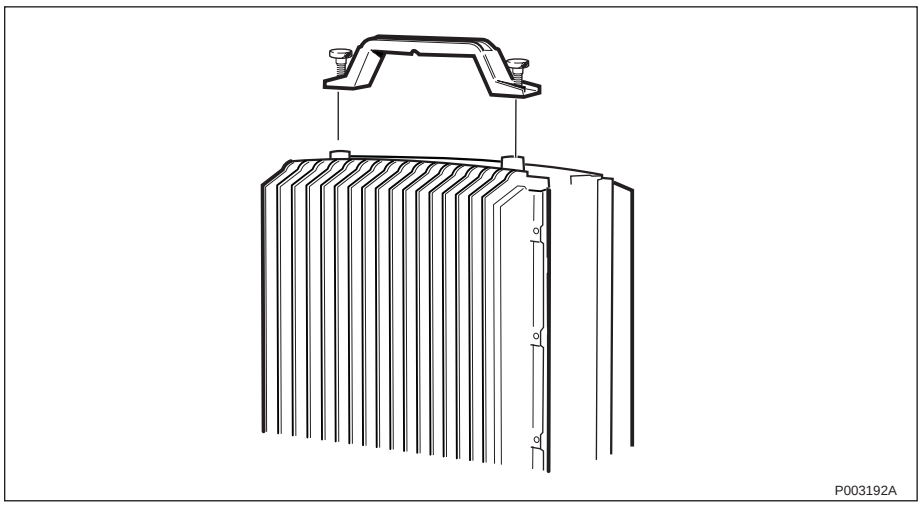

Figure 171 Mounting the lifting handle

1. If the lifting handle (optional) is to be used, mount it on the cabinet and lift the cabinet on to the mounting base.

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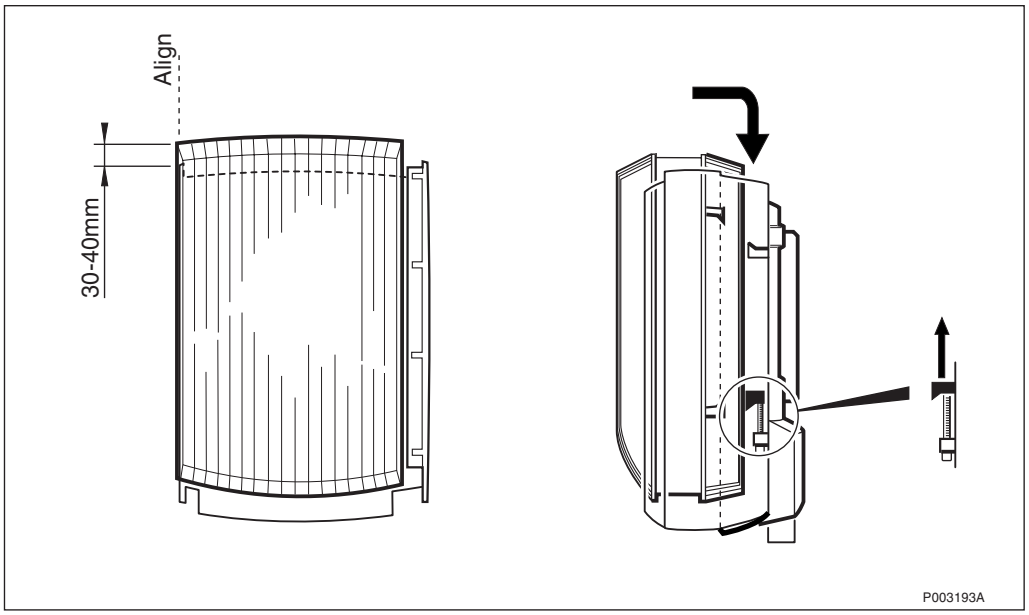

Figure 172 Facilitating mounting the cabinet on the mounting base

2. Facilitate the mounting of the cabinet by aiming for the left side of the cabinet. Start by holding the cabinet a few centimeters above the mounting base. Make sure that the hooks are according to *Figure 172 on page 162*.

3. Hook on the cabinet by pushing it against the mounting base and lower the cabinet on to the hooks.

4. Make sure that the cabinet is properly mounted by verifying that the mounting screws in the installation box correspond to the holes in the cabinet.

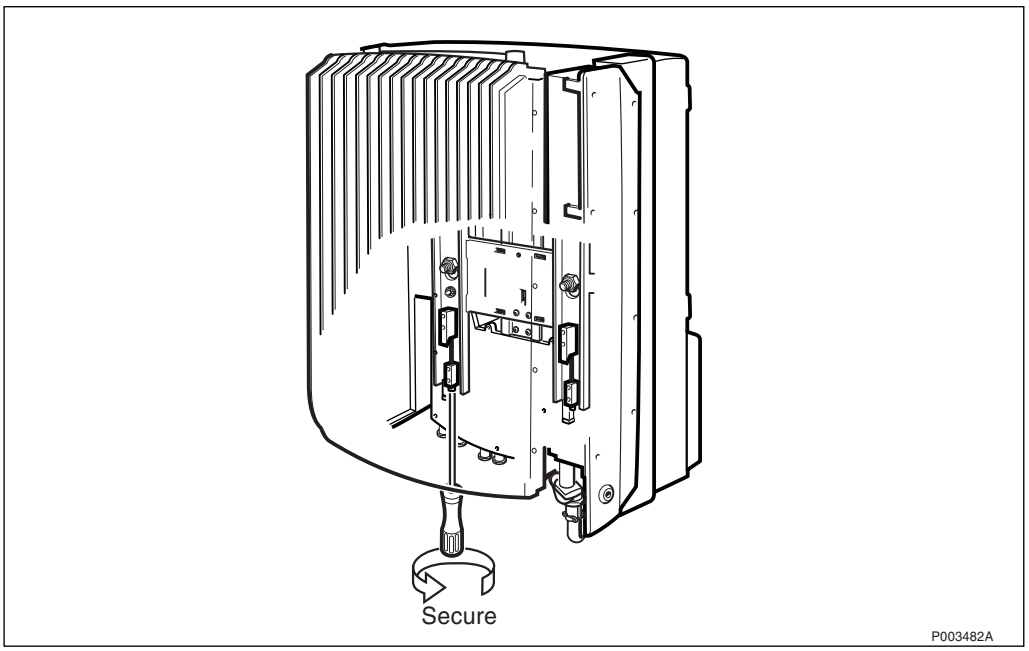

Figure 173 Securing the cabinet

5. Secure the locking cleat under/behind the cabinet by turning the torx screws clockwise until they stop.

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6. If the lifting handle has been used, remove it.

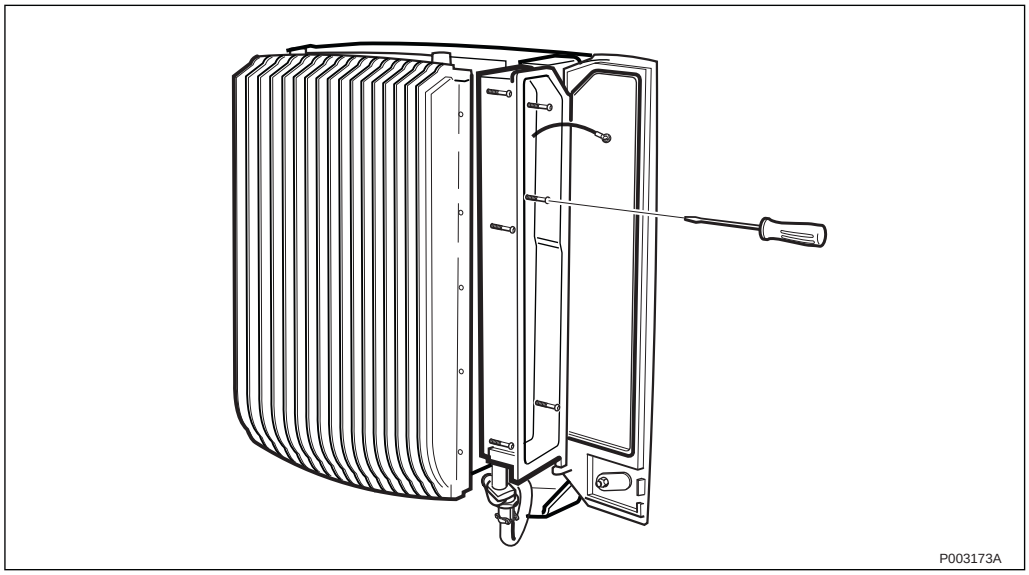

Figure 174 Fastening the installation box

7. Turn each of the 6 torx screws until they engage threads. When all 6 screws have engaged their threads, tighten them.

6.12 Connecting Internal Cables

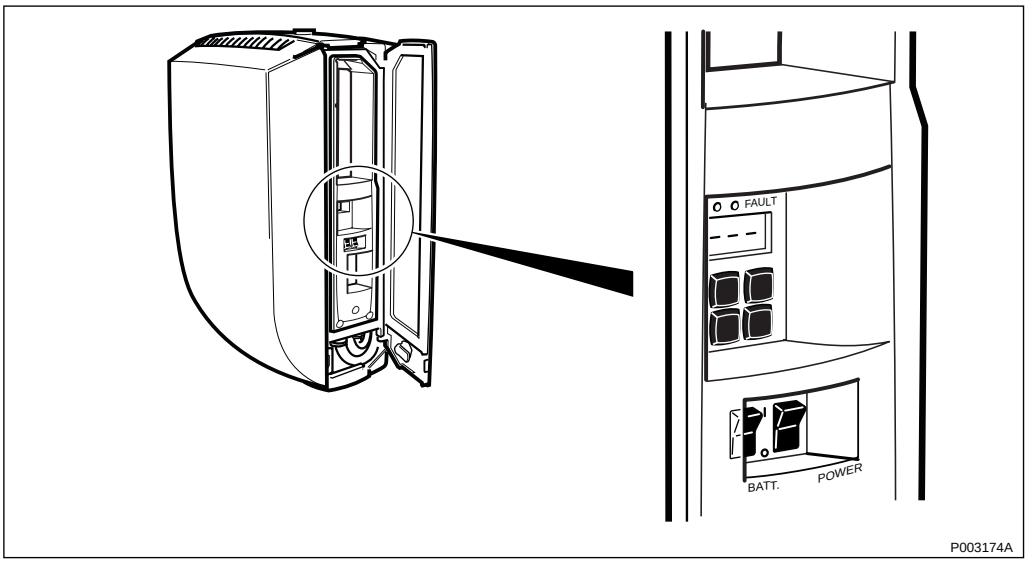

Figure 175 Position of the AC power and battery switches

1. Make sure that the AC power and battery switches are in the OFF position.

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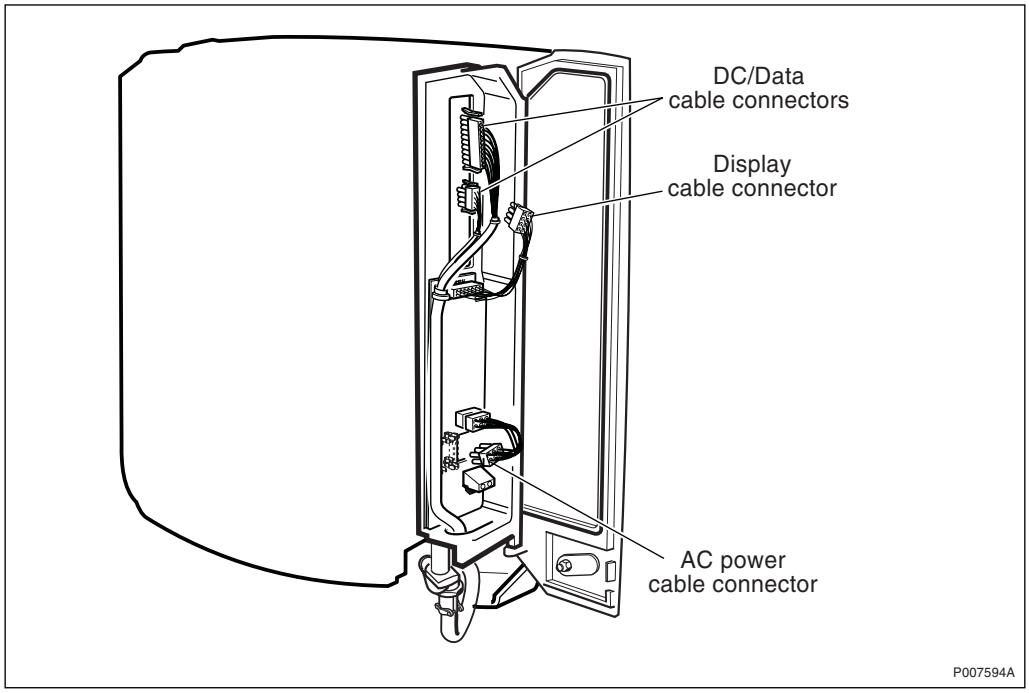

Figure 176 Connecting internal cables

2. Plug the four connectors for the AC power cable, display cable and DC/Data cable in to the cabinet.
3. Remount the protection cover.

6.13 Installing the Batteries

DANGER

Read Safety instructions regarding handling and connecting batteries.

CAUTION

Short circuits can cause injury or damage. Although the battery voltage may be low, the released power can be extremely high.

Note: Batteries must comply with the product specification 1301-BKC 861 available from local Ericsson companies.

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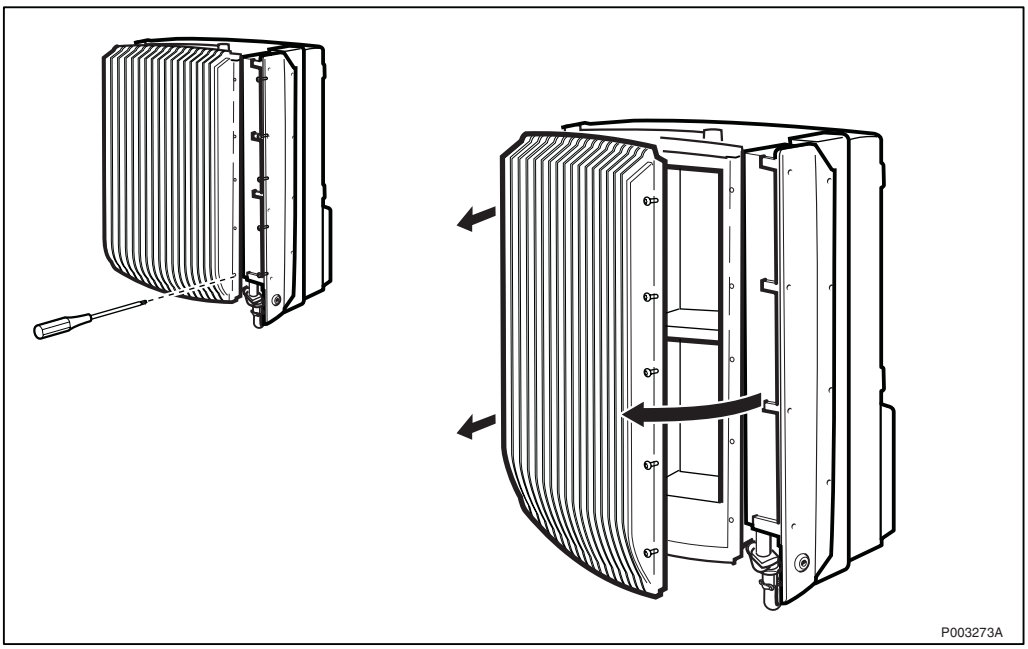

Figure 177 Opening the battery compartment

1. Unscrew the 18 torx screws and make sure that the screws are disengaged.
2. Open the PBC door. The ventilation hose and battery jumper cables are now accessible.

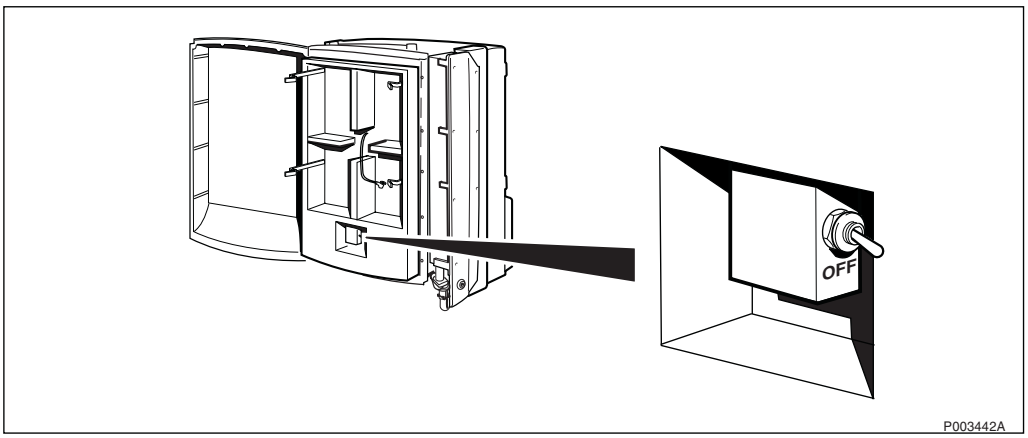

Figure 178 Battery switch position

Note: Ensure that the automatic circuit breaker is in the OFF position.

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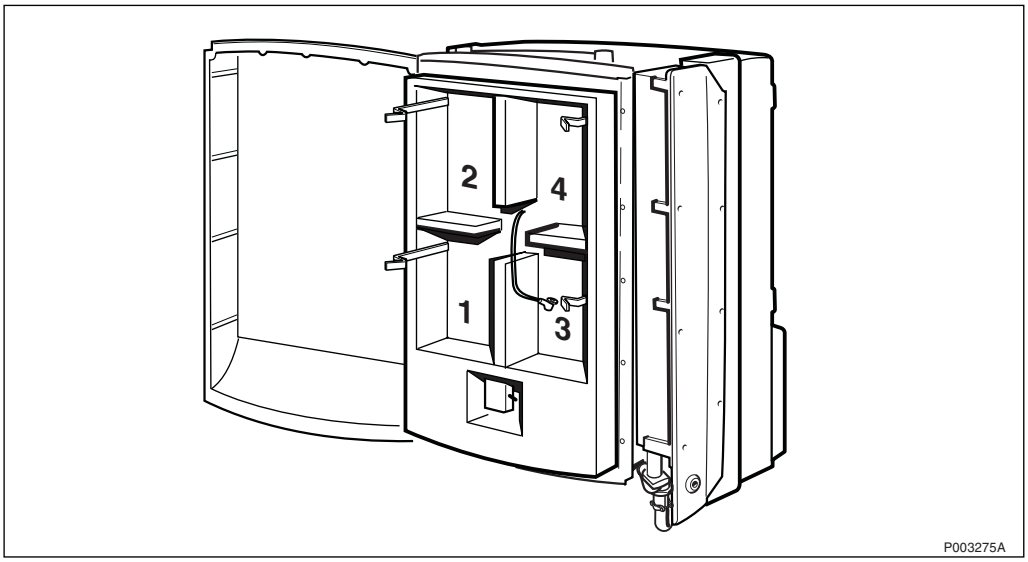

Figure 179 Battery numbering

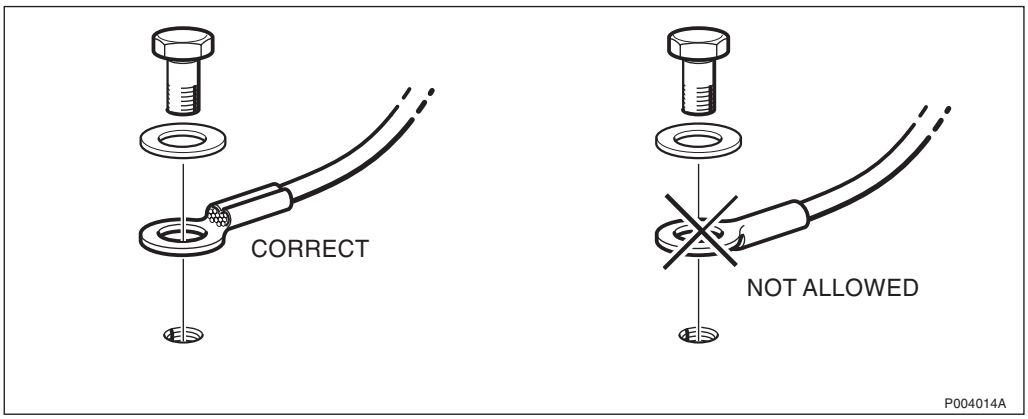

Figure 180 Connecting cable lugs to batteries

Note: Make sure that the cable lugs are properly mounted. If mounted incorrectly, the lugs may break.

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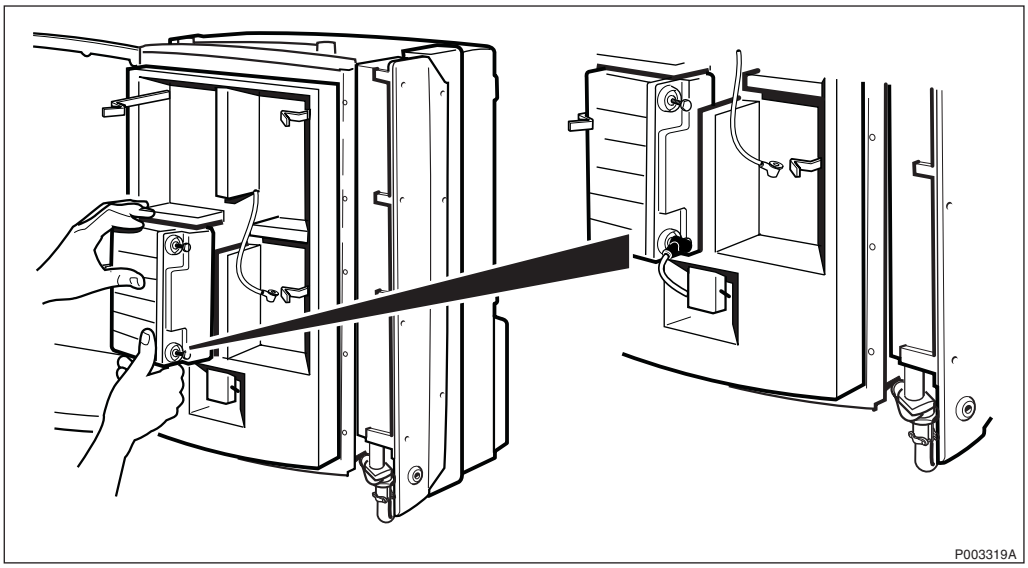

Figure 181 Installing battery 1

Note: Always remember to put on the protective caps to cover the battery poles after each connection.

Note: Remove the precutted tape covering the inlet to the ventilations hose on all batteries.

3. Install battery 1 and connect the cable coming from the battery switch panel to the plus-pole (+).

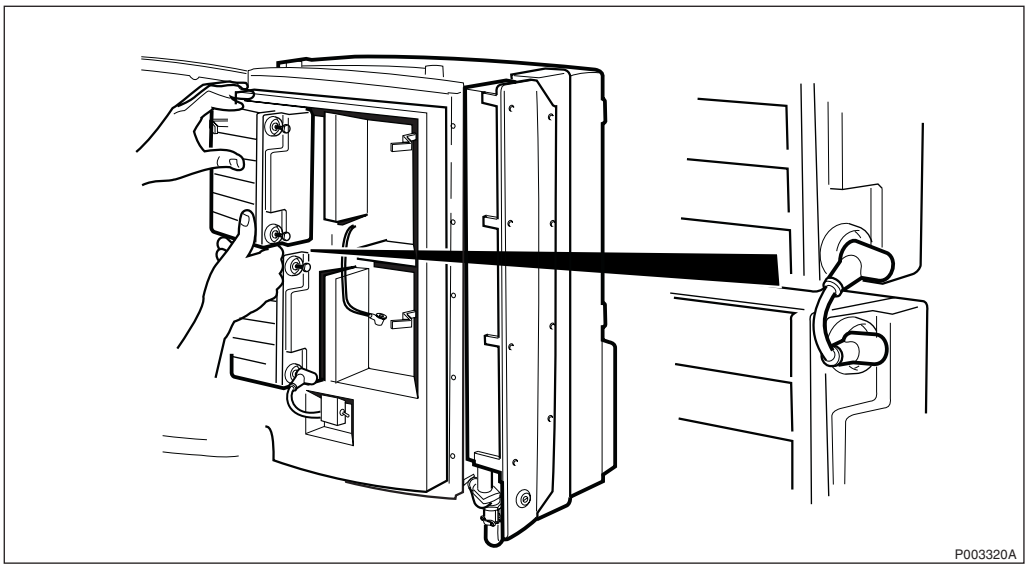

Figure 182 Connecting the first and second battery

4. Install battery 2.
5. Connect the battery jumper cable between battery 1 and battery 2.

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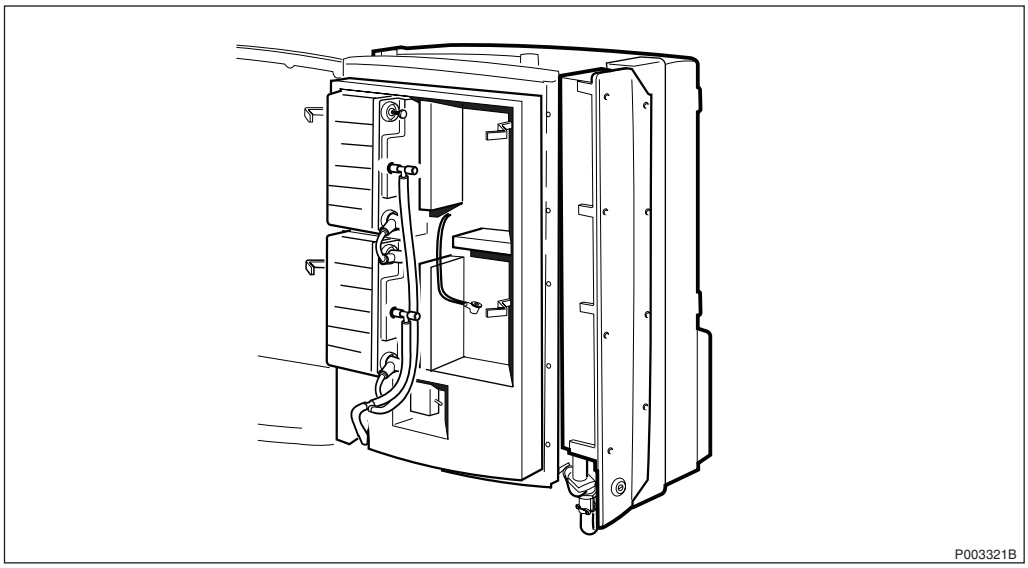

Figure 183 Connecting the ventilation hose

6. Connect the ventilation hose to battery 1 and 2 and guide it to the ventilation outlet down left at the bottom of the cabinet.

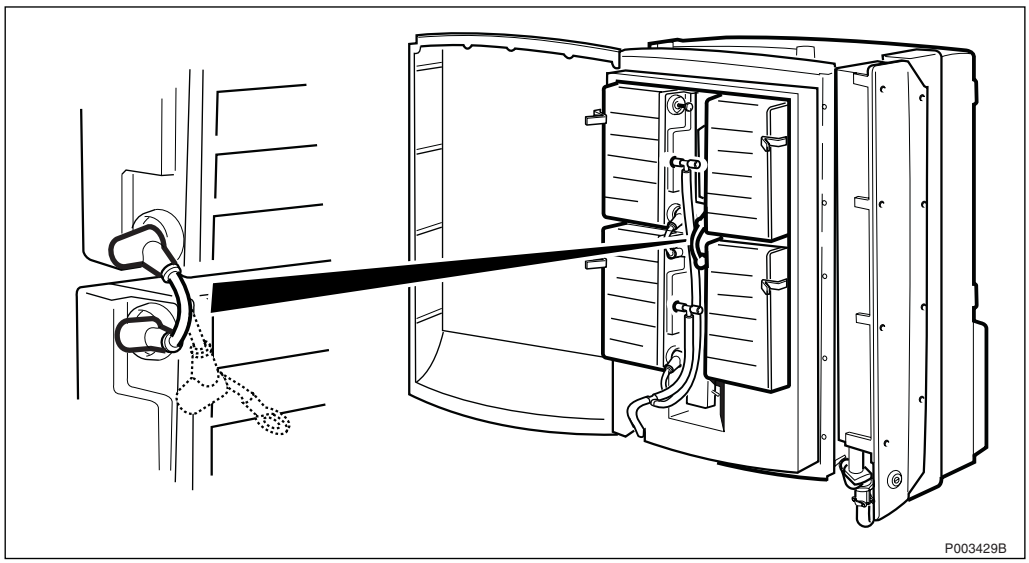

Figure 184 Connecting battery 3 and 4

7. Install battery 3 and 4.
8. Connect the battery jumper cable between battery 3 and 4.

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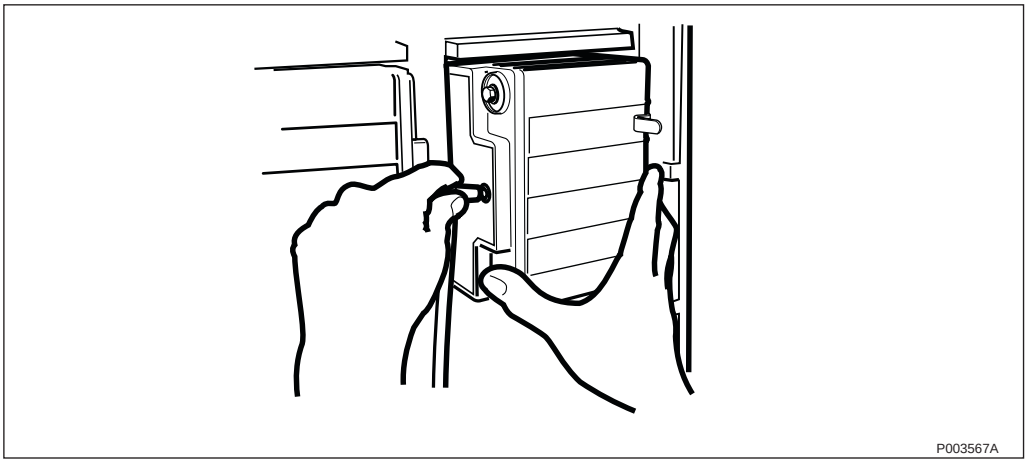

Figure 185 Connecting the ventilation hose

9. Connect the ventilation hose to battery 3 and 4.

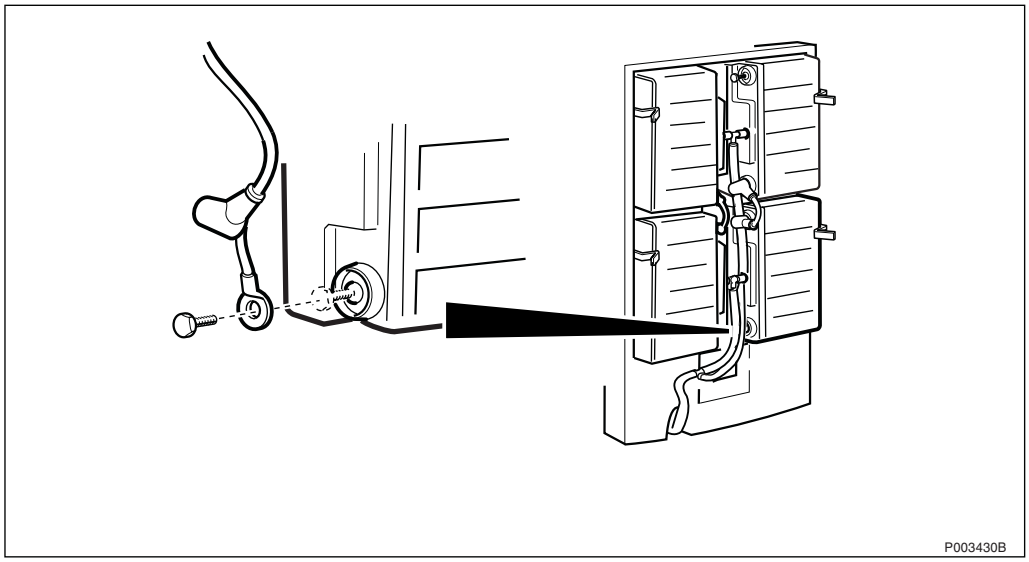

Figure 186 Connecting the minus-pole of battery 3

10. Connect the minus-pole (-) of battery 3.

Note: Ensure that the automatic circuit breaker is in the OFF position.

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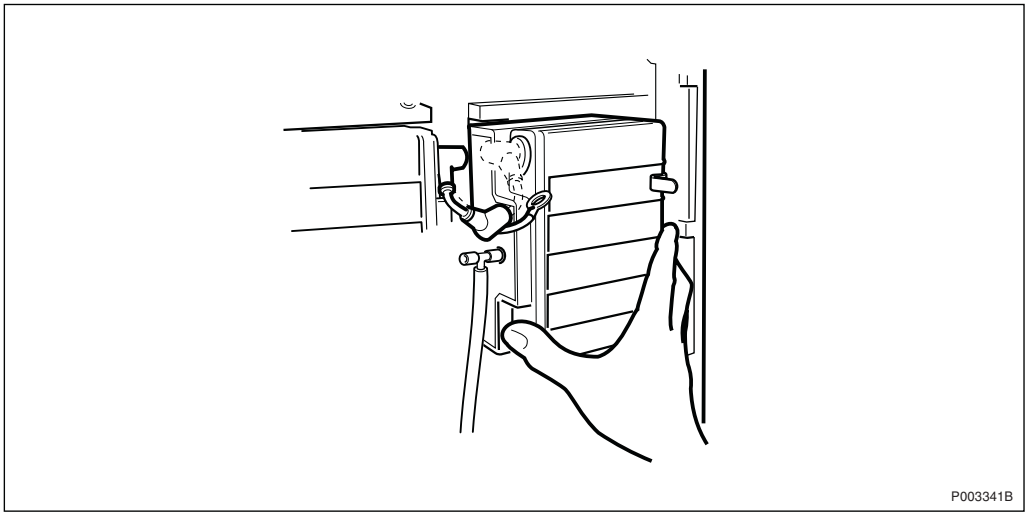

Figure 187 Connecting battery 2 and 4

11. Connect the battery jumper cable to battery 2.
12. Connect battery jumper cable to battery 4.

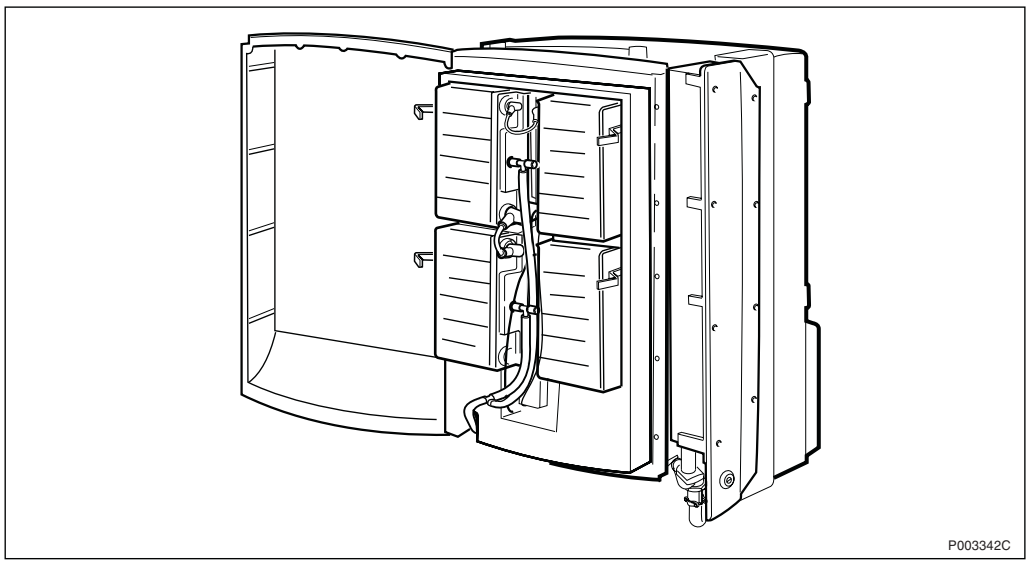

Figure 188 Power and Battery Cabinet

13. Ensure that all cables and hoses are in the correct position so that the door can be closed.
14. Ensure that all protective caps are mounted to cover the battery poles.
15. Ensure that the ventilation hoses are not blocked.
16. Set the automatic circuit breaker in the ON position.
17. Close the PBC door and screw the 18 torx screws back into position.

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6.14 Mounting the Sunshields

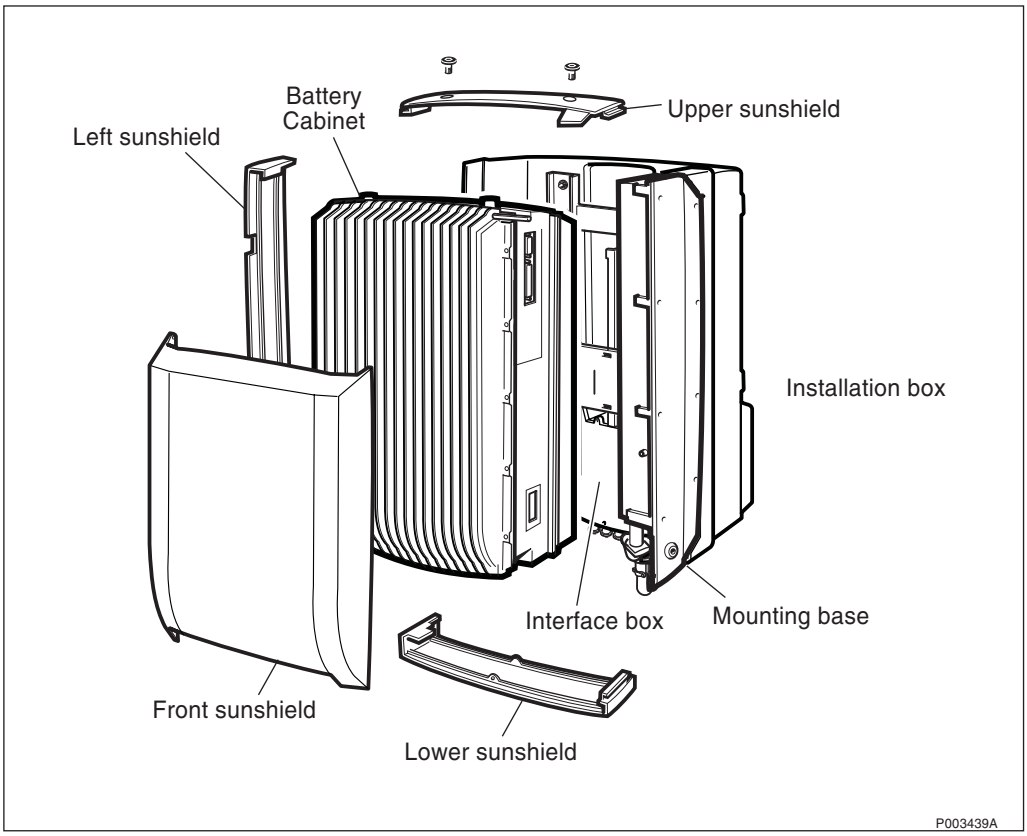

Figure 189 Main units

6.14.1 Upper Sunshield

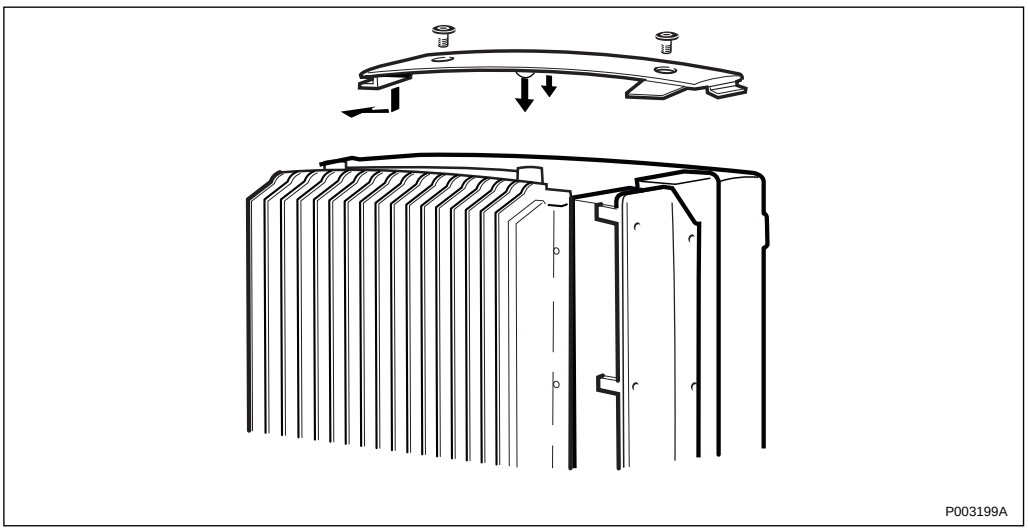

Figure 190 Mounting the upper sunshield

1. Hook on the upper sunshield on the left side.
2. Push it down until it snaps into position.
3. Seal the two holes, intended for the handle with the supplied screw plugs.

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Note: The plugs are to be screwed, *not* pressed.

6.14.2 Left Sunshield

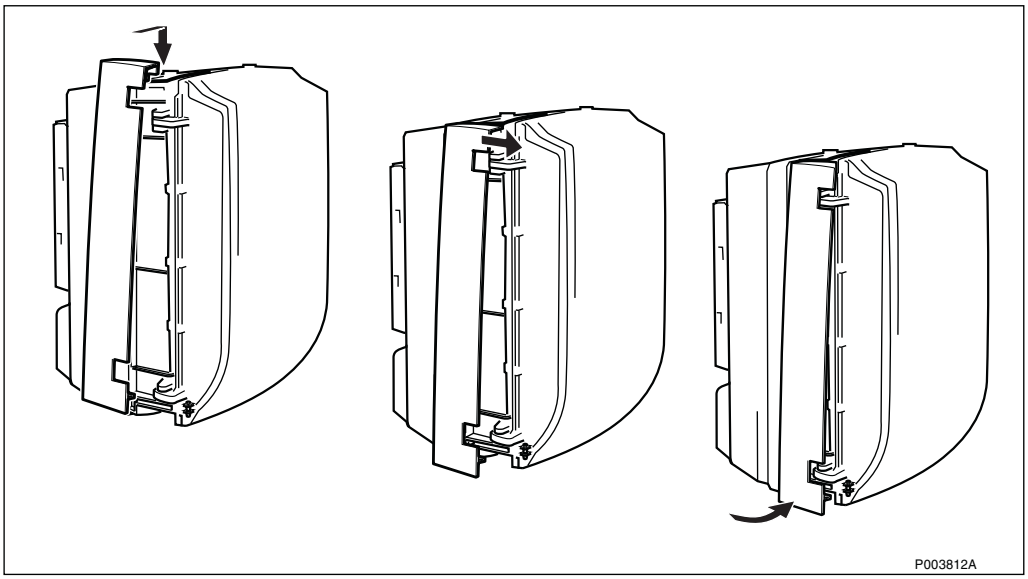

Figure 191 Mounting the left sunshield

1. Tilt the sunshield to the right and hook it on to the cabinet.
2. Push the sunshield forward so that it clears from the hinges.
3. Push on the lower left part of the sunshield until it snaps into position.

6.14.3 Lower Sunshield

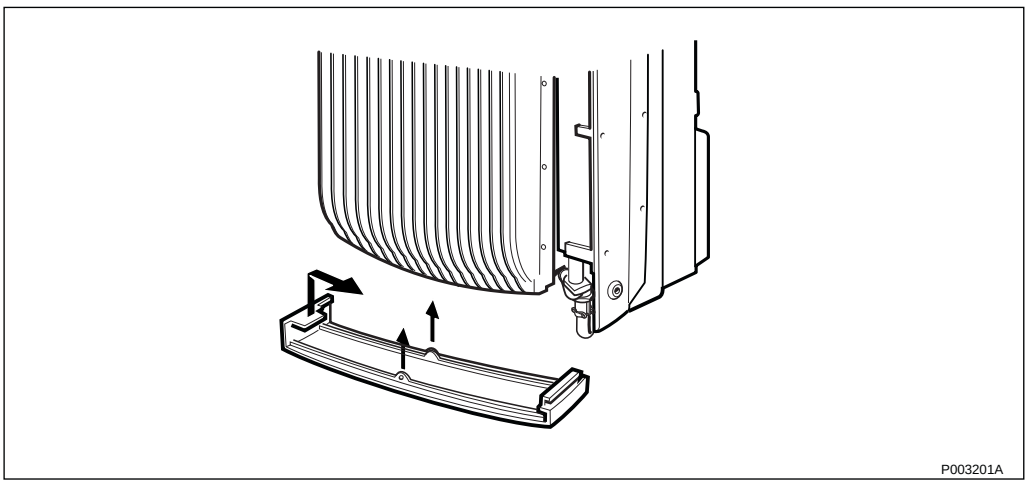

Figure 192 Mounting the lower sunshield

Note: The lower sunshield can only be mounted if the left sunshield is mounted.

1. Hook on the lower sunshield on the cabinets left side.

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2. Push it up until it snaps into the fasteners situated on the middle of the cabinet.

6.14.4 Front Sunshield

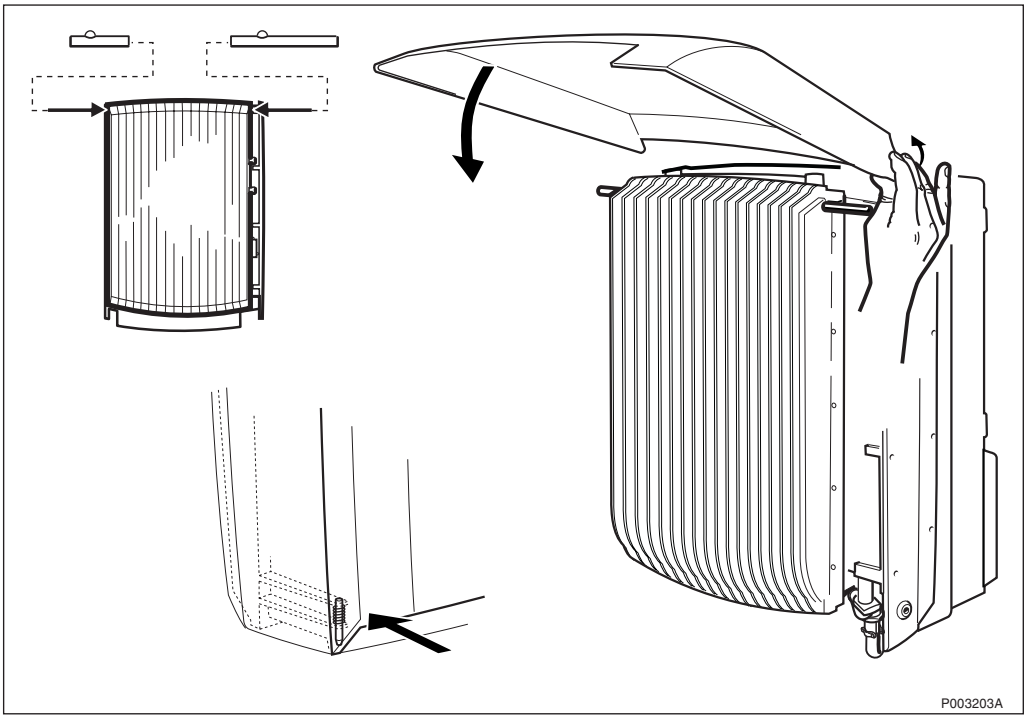

Figure 193 Mounting the front sunshield

1. Mount the short hinge-pin on the left side and the long hinge-pin on the right side.
2. Hook on the front sunshield on the hinges and fold down the cover.
3. Press on the lower left hand corner so that the spring locking pin snaps into position.

6.15 Before leaving the site

- Make sure that all cables are strapped and run in a proper way.
- Make sure that the interface box is pushed up and the screws tightened.
- Make sure that all sunshields are in the position for being locked by the installation box door.
- Close the installation box door, tighten all screws and lock.
- Tidy up the site, remove the unnecessary materials and waste.

Note: The Site Installation Test should follow directly after the installation.

In case of ambient temperature changes between hot and cold, there is a risk of humidity damages of the components

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of the cabinet. To avoid this, the cabinet should not be left wihout power for more than 48 hours.

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7 Antenna System Tests

The purpose of these tests is to verify that the antenna system is properly installed. The tests also include measuring the feeder length to be able to calculate the feeder system loss.

7.1 About these tests

The following instructions describe how to make Standing Wave Ratio (SWR) and Distance To Fault (DTF) measurements on GSM 900/1800/1900 antenna systems using the Anritsu Site Master S331B.

Other models of the Anritsu Site Master can be used if already purchased. The instructions for these older instruments are not included in this manual. The *table below* lists different Site Master models, and wich GSM system they can be used with.

Table 10 Operating range for different models of the Anritsu Site Master

S120A	**S235A**	**S251A/B**	**S231A/B**
GSM 900	—	GSM 900	GSM 900
—	GSM 1800	GSM 1800	GSM 1800
—	GSM 1900	GSM 1900	GSM 1900

After the results are saved in the Site Master, the tester can obtain hard copies by importing the wave forms to a PC. The necessary software and serial cable are enclosed with the Site Master. For more detailed information, see:

Anritsu Site Master User's Guide

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Anritsu Site Master S331B

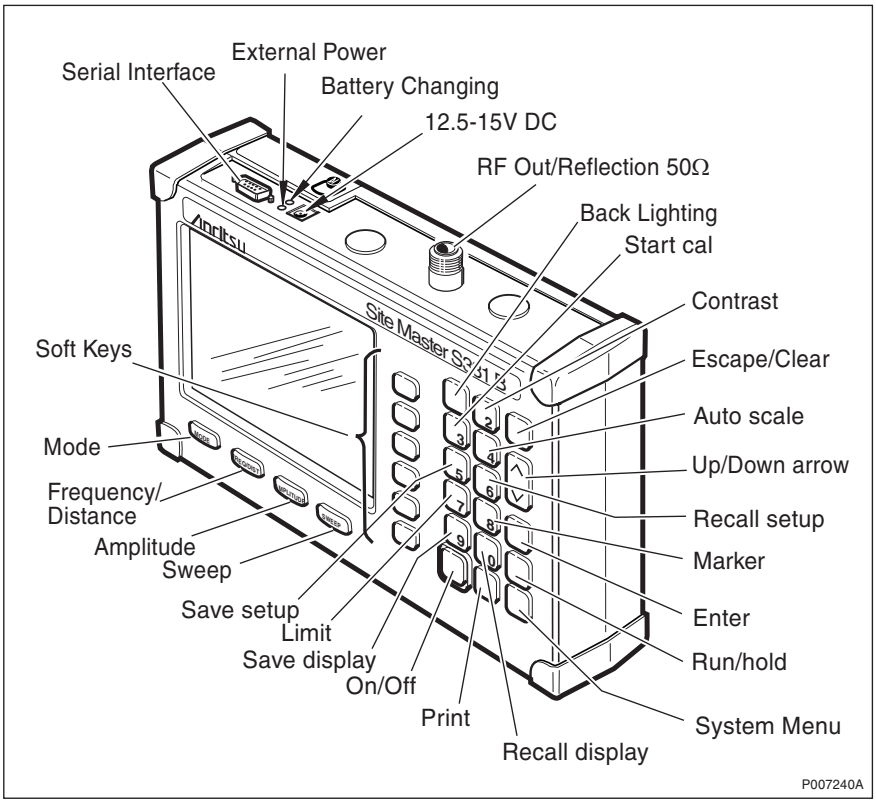

Figure 194 Anritsu Site Master S331B

The keys mentioned in the instructions are found in *the figure above*. In the instructions a "key" is marked with the text describing its function, while "soft key" has its text displayed on the screen, next to the key.

Test Record

The sample test record, *see Figure 203 on page 189*, is a suggestion only and can be modified to suit the actual project.

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Work Flowchart for Testing the Antenna System

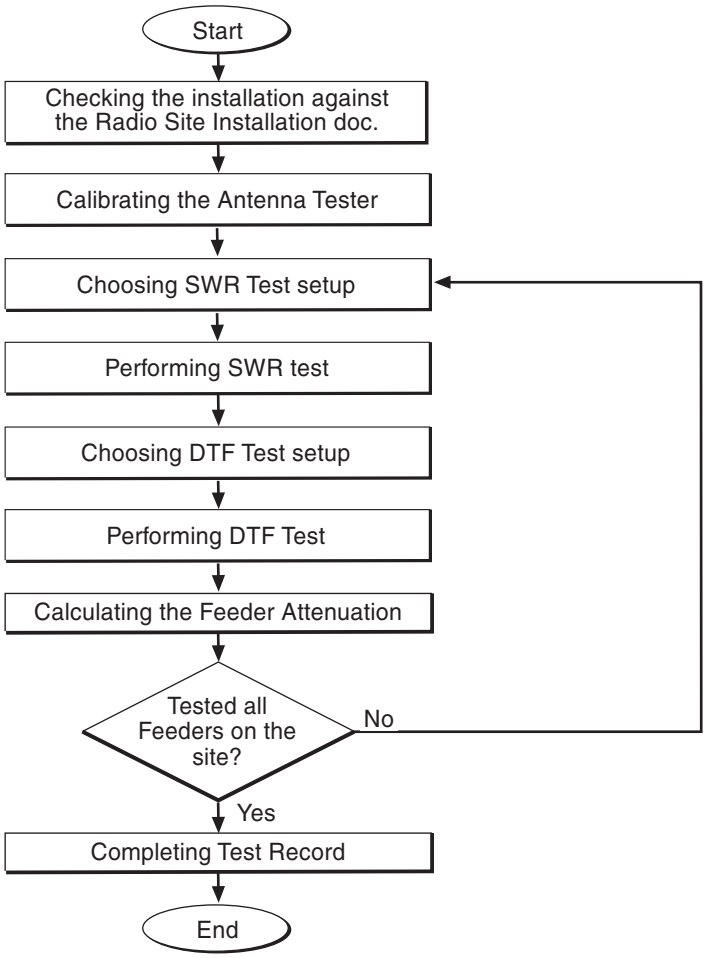

Figure 195 Work flowchart for testing the Antenna system

7.2 Preconditions

The installation of antennas, feeder cables with jumpers.

Do not cover the connectors with sealing tape until all testing is completed.

7.3 Checking the Installation

☐ Verify that the installation is in accordance with the *Radio Site Installation Documentation.*

☐ Check that the right cable is connected to the right antenna.

☐ Check visually that no cables or connectors are damaged and that all cables (feeders and jumpers) are properly marked.

☐ Check that connectors are properly connected and tightened.

☐ Verify the directions of directional antennas against the *Radio Site Installation Documentation*. Consider magnetic influences from

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nearby metallic objects and deviation from magnetic North when using the compass.

☐ Record remarks, if any, in the *Test Record* and forward them to the person responsible for the site installation.

7.4 Calibrating the Antenna Tester

The Site Master must be calibrated to achieve accurate results and to compensate for Test Port Extension Cables.

The frequency range has to be set before calibration. To select frequency range, look in the tables for each test setup in *Section 7.5 on page 179*and *Section 7.7 on page 183*.

Note: The Site Master must be calibrated each time the frequency range is changed.

7.4.1 Select the Frequency Range

1. Press the FREQ/DIST key.
2. Press the F1 soft key, enter the "Start frequency"in MHz, and press ENTER.
3. Press the F2 soft key, enter the "Stop frequency"in MHz, and press ENTER.
4. Check that the FREQ (MHz) scale in the display area indicates the new frequency start and stop values.

Table 11 Start and stop frequencies

System	Start freq. MHz	Stop freq. MHz
GSM 900	890	960
GSM 1800	1710	1880
GSM 1900	1850	1990

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7.4.2 Perform a Calibration

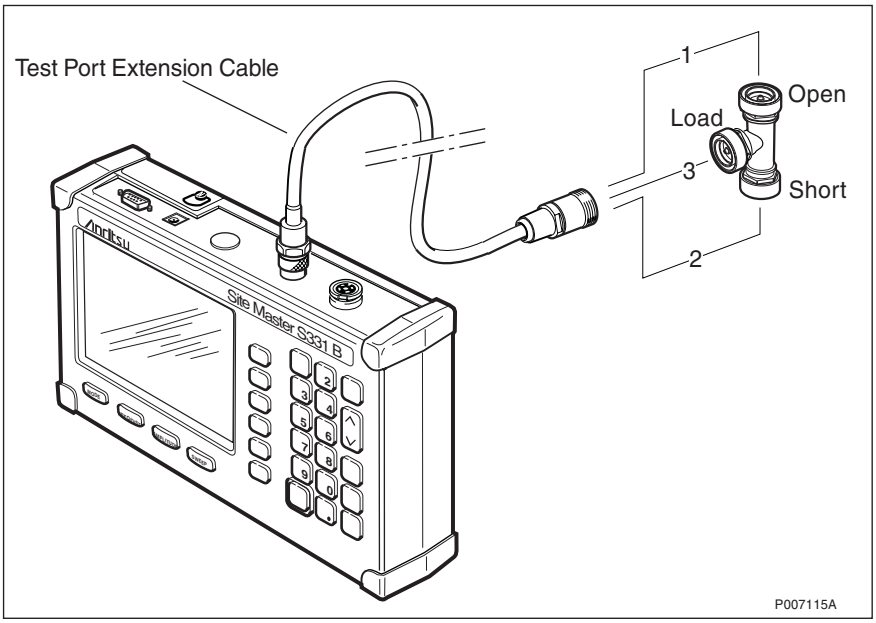

Figure 196 Connecting the calibration components

Perform a measurement calibration according to the instructions below. During the calibration there will be step-by-step instructions on the display. One of the following messages "Measuring OPEN", "Measuring SHORT", "Measuring LOAD" appears while the measurements are in progress.

To perform a calibration, the following calibration components are needed, *see figure above*.

- PRECISION OPEN/SHORT/LOAD

For correct calibration results, ensure that the Open/Short/Load is connected at the end of the Extension Testport Cable, at the same point where the test object will be connected.

1. Connect the Test Port Extension cable.
2. Ensure that the correct frequency range is selected.
3. Press the START CAL key.
4. Follow the instructions in the lower left corner of the screen.
5. When the calibration has been performed, disconnect the calibration equipment from the Test Port Extension Cable.

After the calibration the display will show CAL ON as long as the calibration is valid.

7.5 Choosing SWR Test Setup

The purpose of a Standing Wave Ratio test (SWR) is to verify that the Standing Wave Ratio is not too high and that the signal is not reflected back into the RBS.

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This section contains test setups and information about how to connect the test equipment for an SWR Test on a RBS 2302 passive Antenna System.

The figure shows how to connect the Site Master and the table shows which frequency range to set.

7.5.1 SWR Test Setup for RBS 2302 passive Antenna Systems

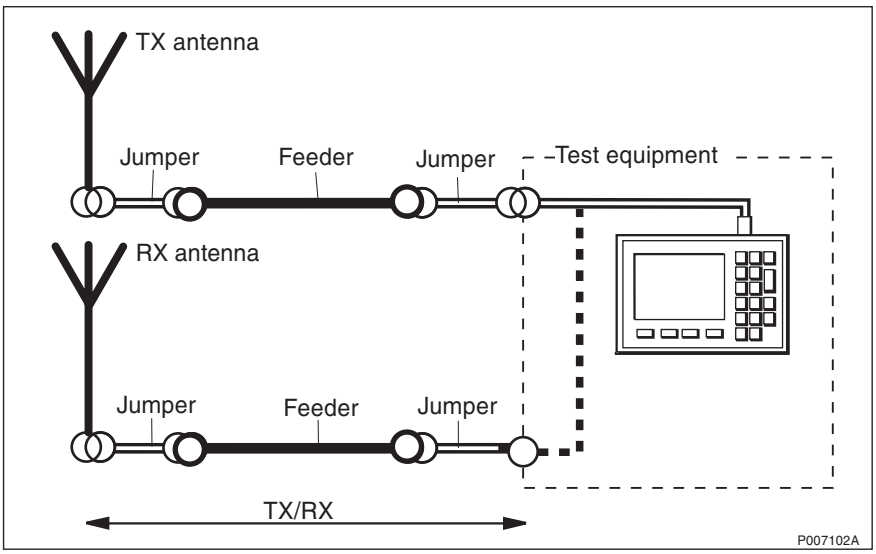

Figure 197 SWR Test Setup for RBS 2302 passive Antenna Systems

1. Use the table below to select the frequency range.
2. Perform an SWR measurement on the X2 feeder system. *See Section 7.6 on page 181*.
3. Perform an SWR measurement on the X3 feeder system.

Table 12 Start and stop frequencies for RBS 2302 passive Antenna Systems

System	Start freq. MHz	Stop freq. MHz
GSM 900	890	960
GSM 1800	1710	1880
GSM 1900	1850	1990

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Measurement examples

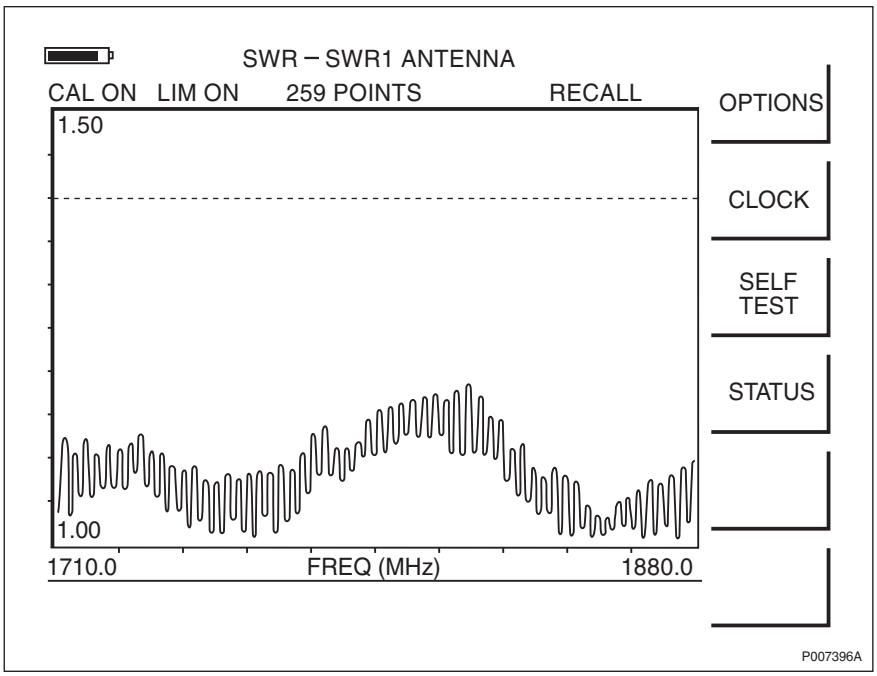

Figure 198 Example of an approved Antenna System

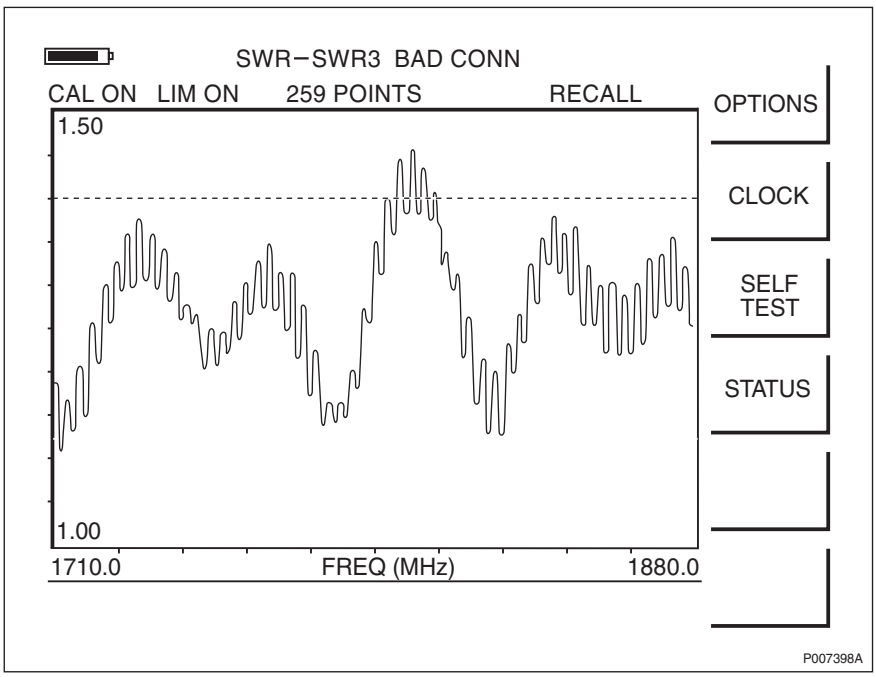

Figure 199 Example of an unapproved Antenna System with a bad connector at antenna jumper

7.6 Performing SWR Test

1. Press the MODE soft key.
2. Select FREQ-SWR by using the Up/Down arrow key and press ENTER.

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3. Calibrate the Site Master for the actual test setup, *see Section 7.4 on page 178*.
4. Connect the test equipment to the the antenna system according to the actual test setup, *see Section 7.5 on page 179*.
5. Check that all connections are properly connected and tightened.
6. Press the AMPLITUDE key.
7. Press the TOP soft key and enter 1.5 for topscale and press ENTER.
8. Press the LIMIT soft key and enter 1.4 as the limit and press ENTER.

Note: Ensure that Limit is not in OFF-mode by pressing the LIMIT ON/OFF key.

9. Observe the waveform and check that no SWR levels are over 1.4 (= 15.6 dB RL), *see Table 13 on page 183*. Enter the test result in the Test Record, *see Figure 203 on page 189*.
10. Save the measurement by pressing the SAVE DISPLAY key.
11. Type in a unique trace name, using the alpha-numeric soft keys, for the measurement and press ENTER.

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Table 13 Conversion table

Return Loss (dB)	SWR	Return Loss (dB)	SWR	Return Loss (dB)	SWR
4.0	4.42	16.0	1.38	28.0	1.08
6.0	3.01	16.2	1.37	28.5	1.07
8.0	2.32	16.4	1.36	29.0	1.07
10.0	1.92	16.6	1.35	29.5	1.07
10.5	1.85	16.8	1.34	30.0	1.06
11.0	1.79	17.0	1.33	30.5	1.06
11.2	1.76	17.2	1.32	31.0	1.05
11.4	1.74	17.4	1.31	31.5	1.05
11.6	1.71	17.6	1.30	32.0	1.05
11.8	1.69	17.8	1.29	32.5	1.04
12.0	1.67	18.0	1.29	33.0	1.04
12.2	1.65	18.5	1.27	33.5	1.04
12.4	1.63	19.0	1.25	34.0	1.04
12.6	1.61	19.5	1.23	34.5	1.03
12.8	1.59	20.0	1.22	35.0	1.03
13.0	1.58	20.5	1.21	35.5	1.03
13.2	1.56	21.0	1.20	36.0	1.03
13.4	1.54	21.5	1.18	36.5	1.03
13.6	1.53	22.0	1.17	37.0	1.02
13.8	1.51	22.5	1.16	37.5	1.02
14.0	1.50	23.0	1.15	38.0	1.02
14.2	1.48	23.5	1.14	38.5	1.02
14.4	1.47	24.0	1.13	39.0	1.02
14.6	1.46	24.5	1.12	39.5	1.02
14.8	1.44	25.0	1.12	40.0	1.02
15.0	1.43	25.5	1.11	40.5	1.01
15.2	1.42	26.0	1.10	41.0	1.01
15.4	1.41	26.5	1.10	41.5	1.01
15.6	1.40	27.0	1.09	42.0	1.01
15.8	1.39	27.5	1.08	42.5	1.01

7.7 Choosing DTF Test Setup

The purpose of the Distance To Fault test (DTF) is to measure the length of the feeder system to be used in the Feeder Attenuation Calculation.

The DTF Test can also be used to find bad connections or other faults (for example sharp bends) in the feeder system, if the SWR Test indicates too high reflections.

This section contains test setups and information about how to connect the test equipment for the DTF Test for a RBS 2302 passive Antenna System.

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The figure shows how to connect the Site Master and the table shows which frequency range to set.

7.7.1 DTF Test Setup for RBS 2302 passive Antenna Systems

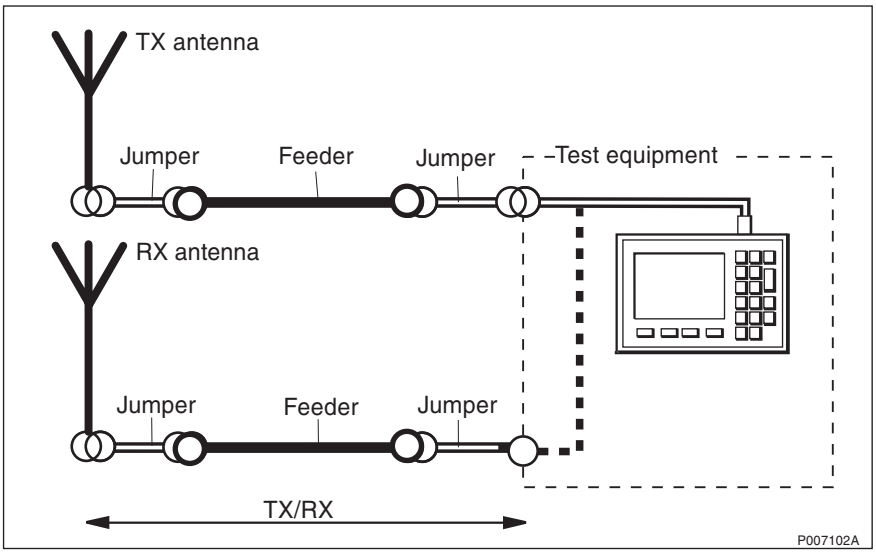

Figure 200 Test Setup for RBS 2302 passive Antenna Systems

1. Use the table below to select the frequency range.
2. Perform a DTF measurement on the X2 feeder system. *See Section 7.8 on page 186.*
3. Perform a DTF measurement on the X3 feeder system.

Table 14 Start and stop frequencies for RBS 2302 passive Antenna Systems

System	Start freq. MHz	Stop freq. MHz
GSM 900	890	960
GSM 1800	1710	1880
GSM 1900	1850	1990

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Measurement examples

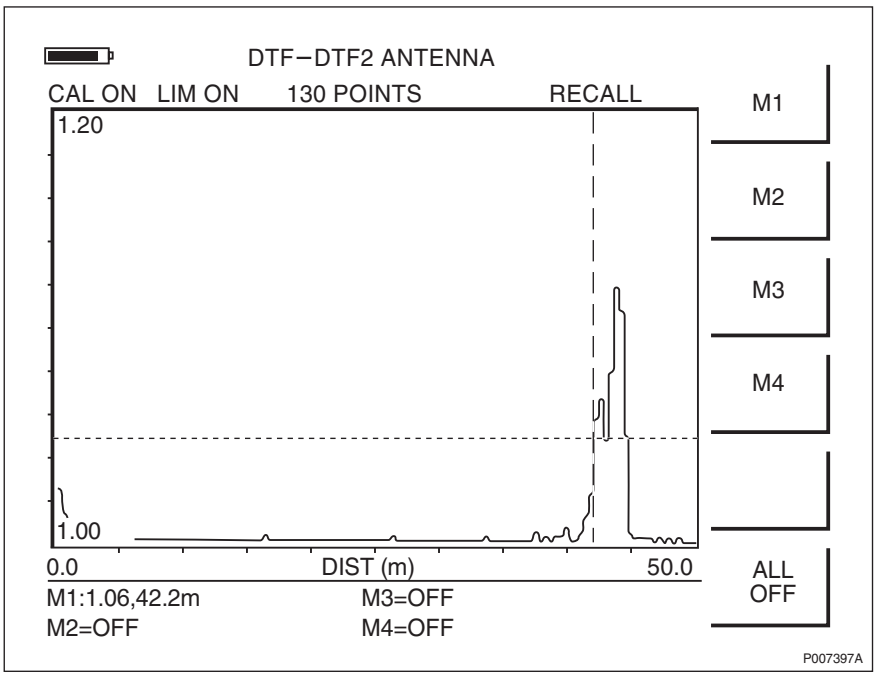

Figure 201 Example of an approved Antenna System

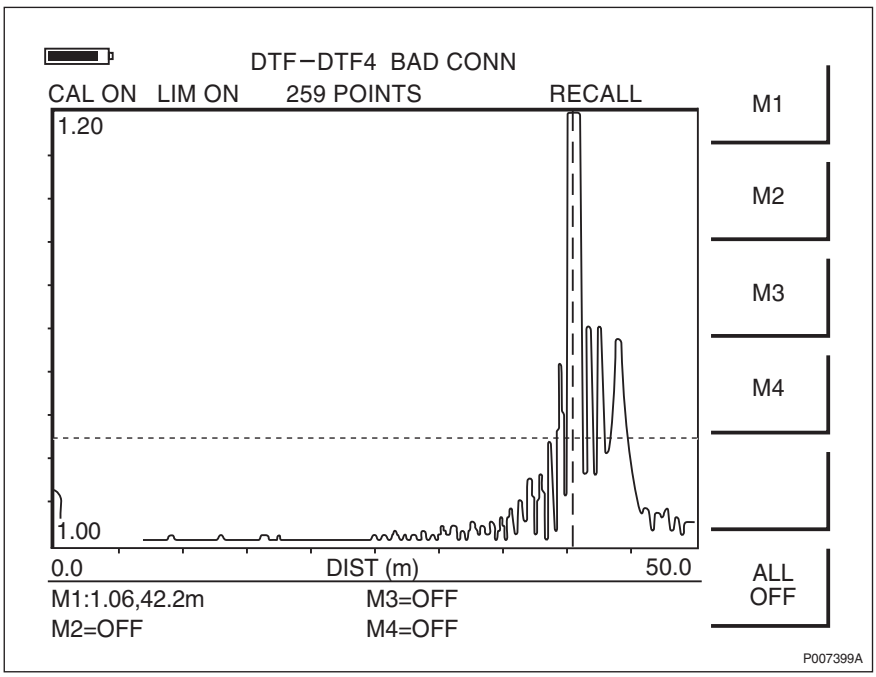

Figure 202 Example of an unapproved Antenna System with a bad connector at the antenna jumper

7.7.2 Entering Cable Parameters

To achieve accurate DTF test results, the correct cable parameters must be entered. Enter the velocity factor and attenuation (dB/m) for the cable type in the feeder system.

1. Press MODE and select DTF—SWR by using the Up/Down arrow key. Press ENTER.

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2. Press the DTF AID soft key.
3. Use the Up/Down arrow key to select CABLE LOSS. Press ENTER.
4. Enter the cable loss in dB per metre, *(see table below)* for the type of cable being tested and press ENTER.
5. Use the Up/Down arrow key to select PROP VEL. Press ENTER.
6. Enter the relative velocity, *(see table below)* for the type of cable being tested and press ENTER.

Table 15 Velocity factor (Vp) and attenuation (dB/m) for different cables

Product No.	Supplier Code	Velocity Factor V_p	Attenuation, dB/m		
			900 MHz	1800 MHz	1900 MHz
TZC 500 80	Andrew 1/2", LDF4RN	0.88	0.069	0.100	0.104
TZC 500 82	Andrew 3/8", LDF2RN	0.88	0.110	0.159	0.166
TZC 501 22	Andrew 7/8", LDF5	0.89	0.039	0.057	0.060
TZC 501 26	Andrew 1/2", LDF4	0.88	0.069	0.100	0.104
TZC 501 28	Andrew 1 5/8", LDF7	0.88	0.023	0.034	0.036
TZC 501 47	Andrew 7/8", LDF5RN	0.89	0.039	0.057	0.059

7.8 Performing DTF Test

1. Press the MODE key.
2. Select the DTF –SWR measurements using the Up/Down arrow key and press ENTER.
3. Calibrate the Site Master for the actual test setup, *see Section 7.4 on page 178*.
4. Enter the correct cable parameters *see Section 7.7.2 Entering Cable Parameters on page 184*.
5. Connect test equipment to the the antenna system according to *Section 7.7 on page 183*.
6. Check that all connections are properly connected and tightened.
7. Press the FREQ/DIST key.
8. Press the D1 soft key and enter the desired numerical start value (usually 0.0 m) from the keypad and press ENTER.
9. Press the D2 soft key and enter the desired numerical stop value (usually the total length of the antenna system) from the keypad and press ENTER.
10. Press the AMPLITUDE key.
11. Press the MAIN soft key.

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12. Press the TOP soft key and enter 1.2 for topscale and press ENTER.

13. Wait while the Site Master calculates (~ 8 sec.).

For feeder length measurements proceed with steps 14 to 15.

For fault finding proceed with step 16.

14. Identify the near and the far end of the feeder.

15. Place markers on the near and the far end and note the difference between the markers, *see examples in Section 7.7 on page 183*. Enter the difference as the feeder length in the Test Record, *see Figure 203 on page 189*.

    Proceed with step 20 to 21.

If the SWR Test indicated reflections that are too large proceed with the following steps to locate the fault.

16. Press the LIMIT soft key and enter 1.05 as the limit and press ENTER.

Note: Ensure that Limit is not in the OFF-mode.

17. Observe the waveform and look for reflections above 1.05 SWR (31.5 dB RL).

Note: The antenna may have a greater reflection than 1.05 SWR but the system is still approved as long as the cables are below the limit.

18. Identify the fault, *see examples in Section 7.7 on page 183,* and correct the fault.

19. Start the measurement again and check that no reflections are above 1.05 SWR (31.5 dB RL).

20. Save the measurement by pressing the SAVE DISPLAY key. The saved display can later be used for the cable attenuation calculation, *see Section 7.9 on page 187*.

21. Type in a unique trace name, using the alpha-numeric soft keys, for the measurement and press ENTER.

7.9 Calculating Feeder Attenuation

The purpose of this procedure is to calculate the attenuation of the feeder system.

Note: If the cable type is not found in *Table 16 on page 188*, values must be taken from the manufacturer's specifications.

1. Use the feeder length measured in the DTF test.

2. Find the attenuation value (dB/m) for the actual cable type in the table below.

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Table 16 Velocity factor (Vp) and attenuation (dB/m) for different cables

Product No.	Supplier Code	Velocity Factor V_p	Attenuation, dB/m		
			900 MHz	1800 MHz	1900 MHz
TZC 500 80	Andrew 1/2", LDF4RN	0.88	0.069	0.100	0.104
TZC 500 82	Andrew 3/8", LDF2RN	0.88	0.110	0.159	0.166
TZC 501 22	Andrew 7/8", LDF5	0.89	0.039	0.057	0.060
TZC 501 26	Andrew 1/2", LDF4	0.88	0.069	0.100	0.104
TZC 501 28	Andrew 1 5/8", LDF7	0.88	0.023	0.034	0.036
TZC 501 47	Andrew 7/8", LDF5RN	0.89	0.039	0.057	0.059

3. Calculate the feeder attenuation by multiplying the actual length in metres by the attenuation per metre.
4. Calculate the total feeder attenuation by adding the attenuation of the different components in the TX/RX path.
5. Check that the attenuation calculation is correct. If the calculation is correct then perform a DTF test to detect possible faults, such as bad connectors, damaged feeders and so on, according to *Section 7.8 on page 186*. Locate the fault and make necessary corrections. Go back to step 3.
6. Enter the result of the calculation in the test record, *see Figure 203 on page 189*.
7. Repeat step 1 for all antenna feeders at the base station.

7.9.1 Examples of Feeder Attenuation calculations

The cable data in the examples below refer to *Table 16 on page 188*.

Example for 900 MHz, Passive Antenna System:

- Feeder type LDF 7/8”:

  Length = 63 m, attenuation per m = 0.038 dB.

  Actual attenuation = 63 x 0.038 = 2.4 dB
- Antenna jumper type LDF 1/2”:

  Length = 2 m, attenuation per m = 0.068 dB.

  Actual attenuation = 2 x 0.068 = 0.14 dB
- RBS jumper type LDF 1/2”:

  Length = 2 m, Attenuation per m = 0.68 dB.

  Actual attenuation = 2 x 0.68 = 0.14 dB
- Total attenuation = 2.4 + 0.14 + 0.14 = 2.7 dB.

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7.10 Test Record

Test Record for Antenna System Tests

Date.	Site Name:
Site No:	Cell configuration:
Testers Name:	
Test instrument: Anritsu Site Master S_____	Serial Number:

Test Results

Cell

Installation check

Visual check

Antenna direction ____ Degrees

SWR Test

<1.4 SWR or>15.6 dB RL

	RBS 1		RBS 2		RBS 3	
	X 2	X 3	X 2	X 3	X 2	X 3
SWR						
Return loss						dB

DTF Test

	RBS 1		RBS 2		RBS 3	
DTF Test	X 2	X 3	X 2	X 3	X 2	X 3
(< 1.05 SWR) P/F						

X2 equals the path from the X2 connector on the RBS to the antenna, including jumper and feeder.

X3 equals the path from the X3 connector on the RBS to the antenna, including jumper and feeder.

Cable marking: _____

_____

_____

Signatures

Responsible for the record Date: _____ Name: _____

Customer acceptance Date: _____ Name: _____

Remarks _____

_____

P006028C

Figure 203 An example of a test record

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7.10.1 Test Record Supplement

The following illustration shows an example of a printout from the Site Master Software Tools. This can be added as a supplement to the test protocol.

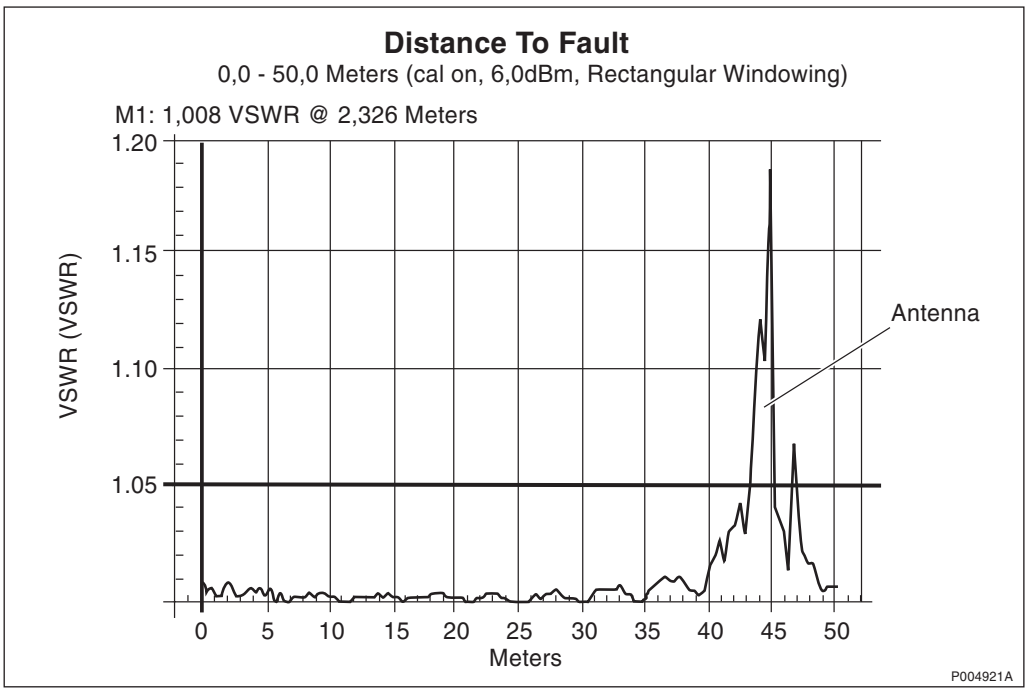

Figure 204 An example of a display showing DTF measurement.

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8 Site Installation Tests

8.1 Preface

The radio cabinet has already been tested in the factory. This chapter describes the tests that must be performed to verify the installation of the radio cabinet.

8.1.1 About These Tests

The tests in this chapter are described in the order in which they are to be performed. When the exit criteria are fulfilled, the tester should return to the flowchart for the next step in the process.

During the tests a test record should be filled in with the results, *see Section 8.22 Test Record on page 237.*

8.1.2 Testing Procedure

The flowchart in Figure 216 on page 207 describes the recommended work order when testing a RBS 2302 cabinet. The work order can be altered, or tests can be removed due to local circumstances, but if so, an investigation of the consequences must be carried out. If the work order is changed or tests are removed, the department responsible for this manual must be notified and agree to the changes, or the responsibility is automatically transferred to the person making the changes.

8.2 Preconditions

8.2.1 Previous Records

Collect all previous records and check that they have been filled in.

- Antenna Test Record
- RF Test Record (from factory)

8.2.2 Software requirements

In order to be able to use certain configurations, the software for the BSC and the RBS must comply with the minimum requirements presented in the table below.

Table 17 Software requirements for different configurations

Configuration	**Lowest BSC SW version required**	**Lowest RBS SW version required** **(Name displayed in the OMT)**
RBS 2302, 2 TRX	BSS R6	LZY 213 431/1 R12 (R012J)
RBS 2302, 4 or 6 TRX	BSS R7	LZY 213 938/1 R7/1 (R071N)

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8.2.3 Removal of Conducting Material

Note that all personal rings, wrist-watches and other metallic objects must be removed before working with the power system. Also follow carefully the safety instructions on power in the *chapter Safety*.

Always use an approved antistatic bracelet to avoid damage to components mounted on printed board assemblies.

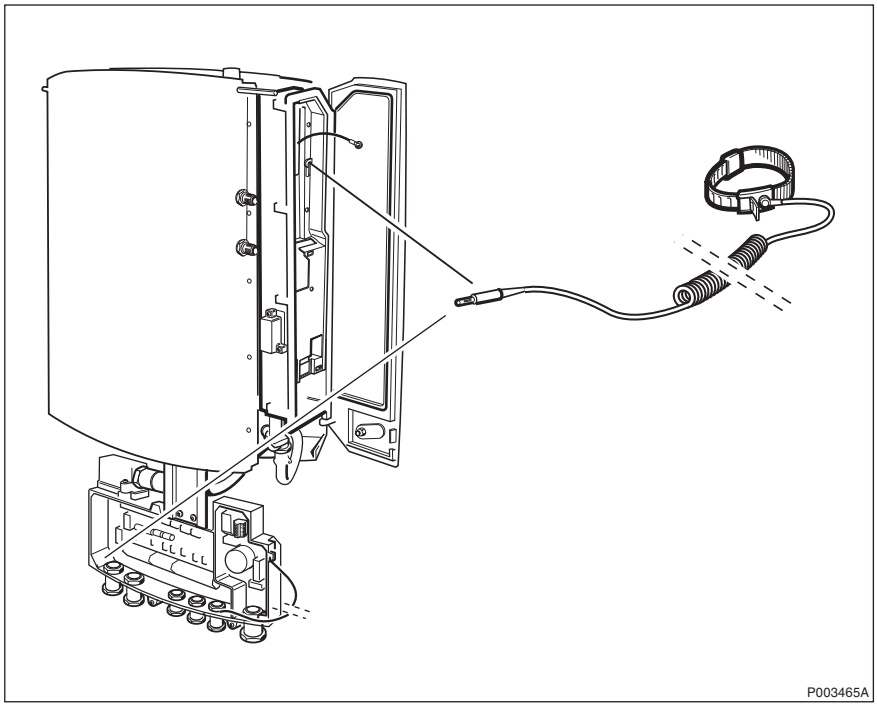

Figure 205 Connecting the ESD wrist strap to the RBS

8.3 Radio Cabinet RBS 2302

8.3.1 Introduction

The purpose of this chapter is to familiarize the user with the RBS. The location of the Interface is shown, and an explanation on how to read the alarms is supplied.

8.3.2 Location of the RBS User Interface

The RBS user interface, including optical indicators, power switches and control buttons, is located behind the installation box door.

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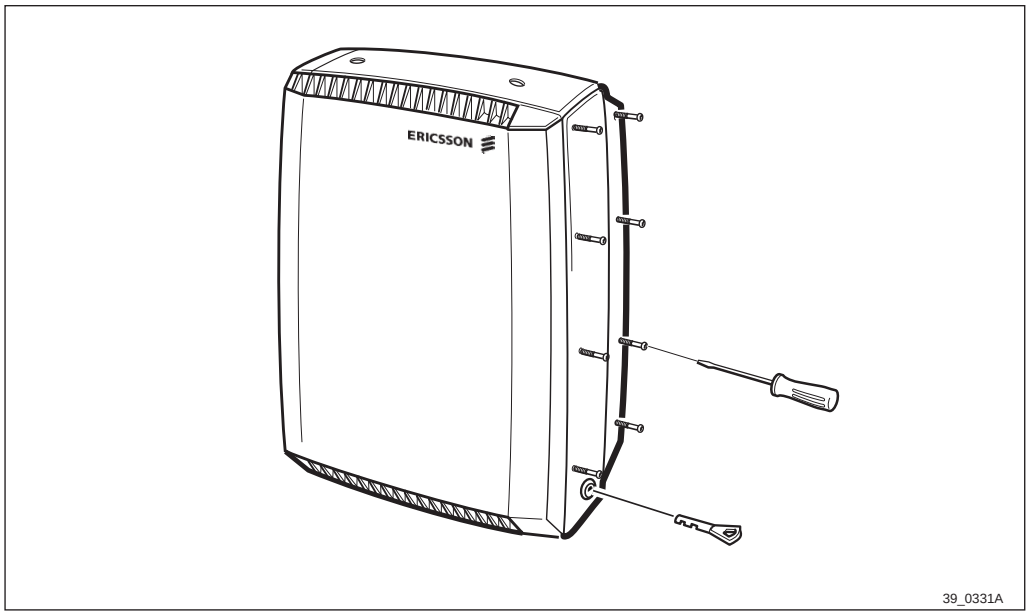

Figure 206 Sealing screws and key for the installation box door

To open the door: loosen the sealing screws and unlock with the key.

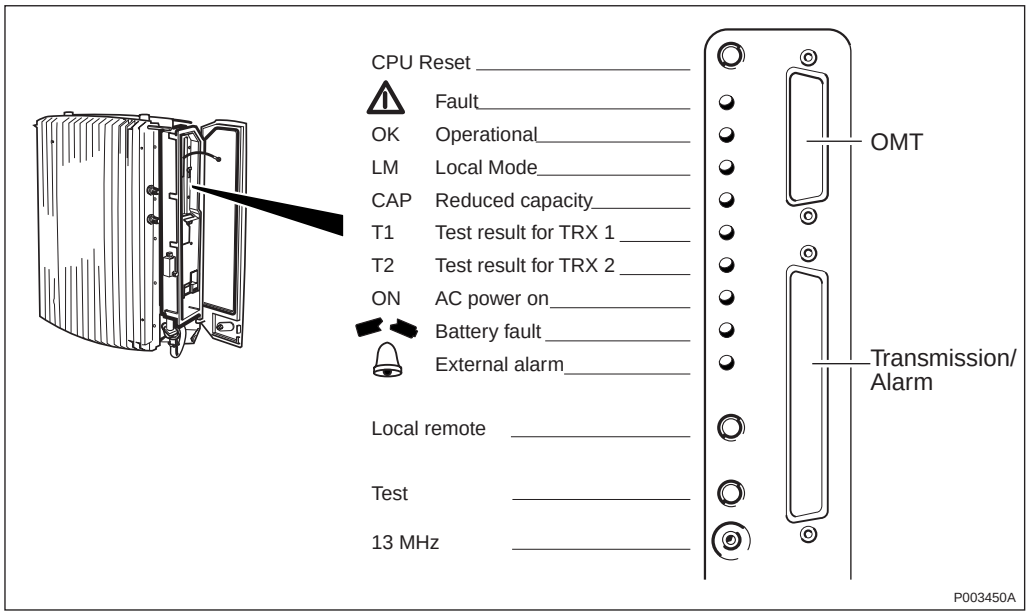

Figure 207 RBS user interface

8.3.3 Optical Indicators

The purpose of the optical indicators is to provide a quick way of indicating the operational status of the included equipment.

The general principles are:

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Red:	A fault is located, check with OMT.
Yellow:	Operational (Local Mode, AC Power on).
	Faulty (Battery Fault, External Alarms, Reduced Capacity).
Green:	Operational.
Flashing indicators:	Wait, activity in progress.

The optical indicators can indicate that a fault/faults have been detected, and the OMT should therefore be used for more advanced fault localisation.

Explanation of the Indicators

Indicator	Mode	Description
Fault	**Generally:**	
(Red)	OFF	No fault(s) detected.
	ON	Fault(s) detected.
Fault [1]	FLASHING	One of the following reasons:
(Red)	(Master or Extension cabinet)	• IDB is missing or wrongly configured. • Fault(s) detected in Extension cabinet(s) (only for 4 TRX / 6 TRX sector configuration) • Running on Base Application • ARAE fault (BSS R7 or later) • Battery fault
	4 TRX / 6 TRX sector configuration:	
	ON (Extension cabinet) and FLASHING (Master cabinet)	• SW/HW fault in Extension cabinet and/or Master cabinet.

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Indicator	Mode	Description
Operational[1] (Green)	OFF	Not operational, or change Local/Remote mode in progress.
	ON	When in local mode: • Operational, but not in traffic. When in remote mode: • Connected to BSC and considered operational by the BSC.
	FLASHING	One of the following reasons: • Receiving application software. Restart pending. • Configuration in progress (this may take more than 10 seconds to complete).
Local mode [1] (Yellow)	OFF	The RBS is in remote mode.
	ON	The RBS is in local mode.
	FLASHING	Change of mode in progress.
Reduced Capacity[1] (Yellow)	OFF	All TRXs are operational.
	ON	At least one TRX is not operational.
T1 Test result for TRX 1		Not used
T2 Test result for TRX 2		Not used
AC Power On[1] (Yellow)	OFF	AC power not available.
	ON	AC power available.
Battery Fault[1] (Yellow)	OFF	Battery connected.
	ON	Battery disconnected or faulty. Low battery DC voltage.
External Alarms [1] (Yellow)	OFF	No external alarm(s) active.
	ON	External alarm(s) active.
	ON (Extension cabinet) and FLASHING (Master cabinet)	External alarm on Extension cabinet(s).

[1] Indicated on all cabinets.

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8.3.4 Switches and Connectors

Switches

Switch	Function
CPU reset button (1)	Reset of the RBS
Local remote button (1)	Change between Local/Remote mode
Test	Not used

(1) Configuration 4 TRX or 6 TRX: CPU reset and change of mode can be performed on both Master and Extension cabinet(s).

Connectors

Connector	Function
OMT	Connector for the OMT cable
13 MHz	Connector for RF measurements and calibration

Note: Configuration 4/6 TRX: all cabinets are controlled by the OMT connector on the Master cabinet.

8.3.5 Power Switches in the RBS

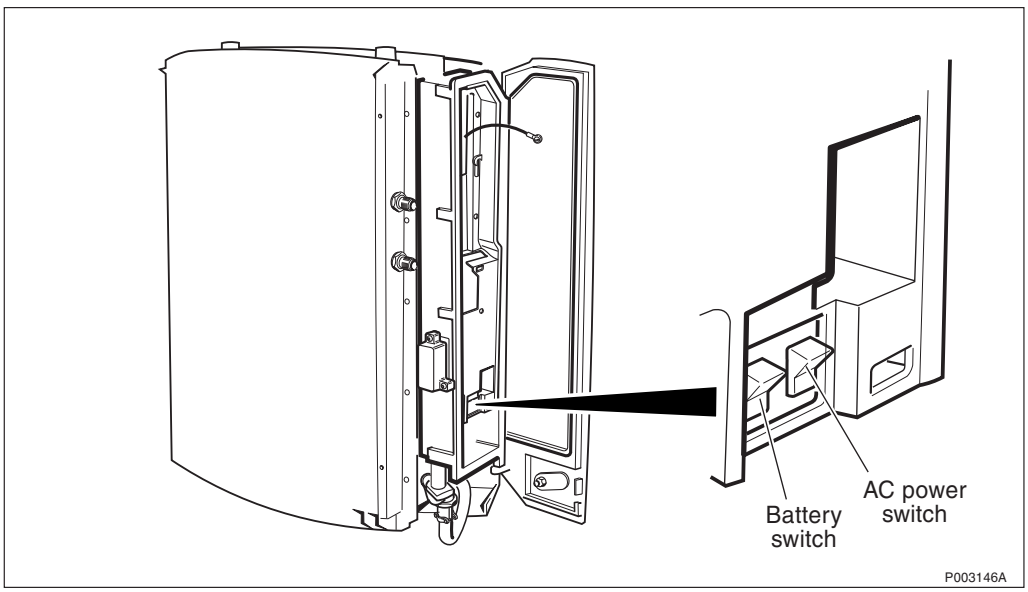

Figure 208 Power switches in the RBS

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DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

Note: When the AC power supply is turned off with the power switch in the RBS, there is still AC voltage both on the AC board in the interface box, and on the connection board in the installation box up to the AC power switch.

8.4 Power and Battery Cabinet(Optional)

8.4.1 Introduction

The purpose of this chapter is to familiarize the user with the Power and Battery Cabinet (PBC). The location of the control panel is shown, and an explanation on how to read the alarms and executed command on the PBC display is supplied.

8.4.2 Location of the PBC Control Panel

The PBC control panel, including optical indicators, power switches and control buttons, is located behind the installation box door.

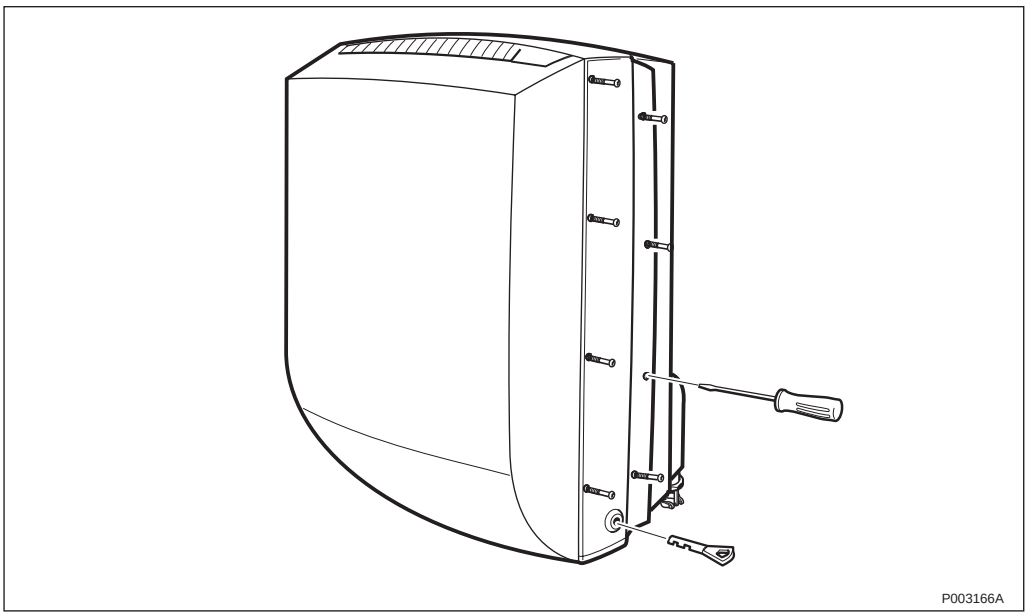

Figure 209 Sealing screws and key for the installation box door

To open the door: loosen the screws and unlock with the key.

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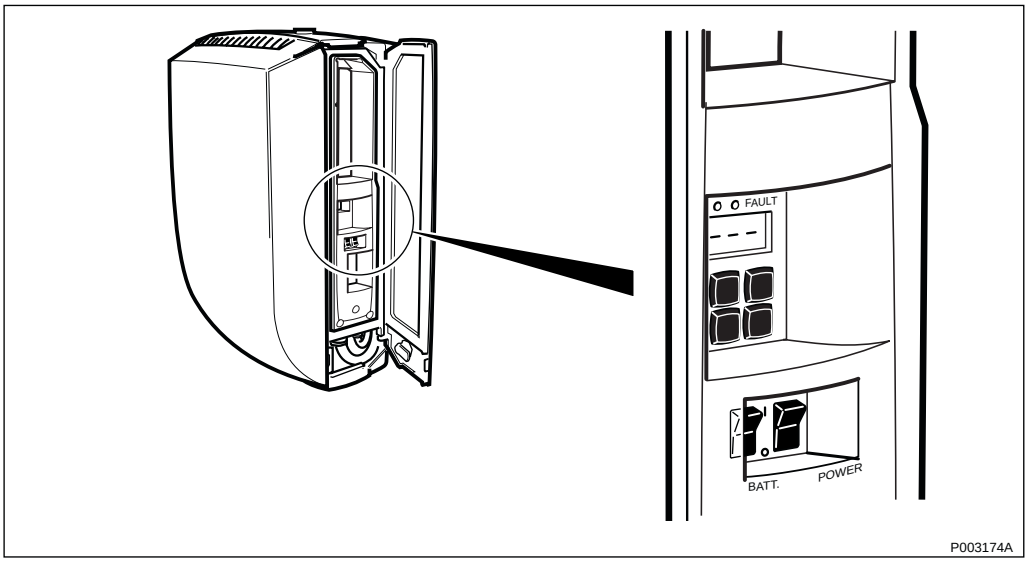

Figure 210 Location of the control panel in the PBC

8.4.3 Control panel

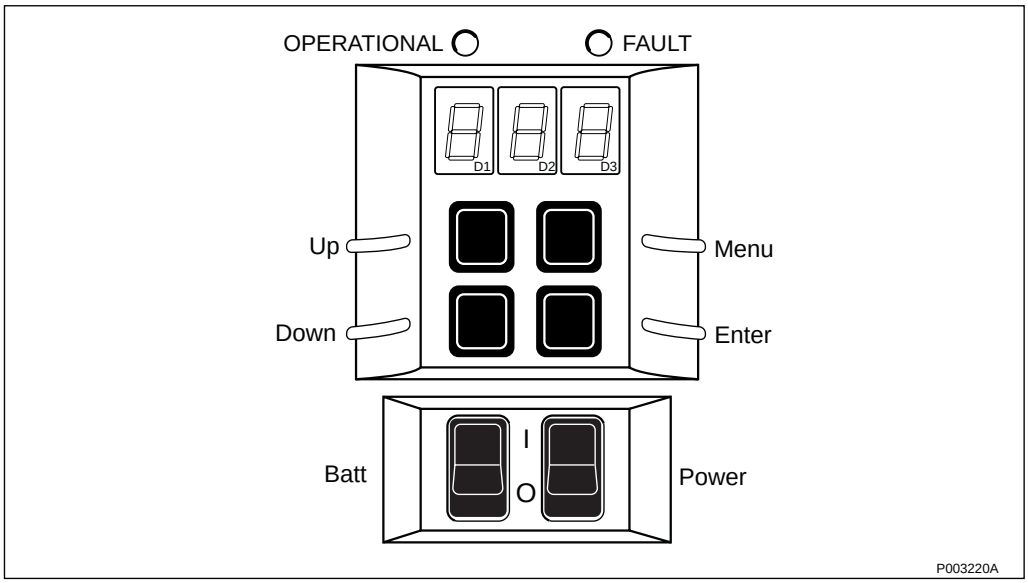

Figure 211 PBC control panel

Optical Indicators

The LED indicators give the following information on the current system status valid for the PBC alarms:

Table 18 Explanation of the LED indicators

Operational (Green)	Fault (Red)	Classification
ON	OFF	OK
OFF	ON	SEVERE
ON	ON	WARNING, POWER

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Alarm Display

The alarms are shown as fault codes on the display. The display is divided into three display elements:

Element 1 (D1)	Unit number. The unit number is used to identify the faulty unit. 0 = PBC (Unit numbers 1–9 are not used for RBS 2302)
Element 2 (D2)	Alarm class. The alarm is classified according to the degree of severity. There are two Classified alarms, and one Not classified alarm: 0 = Not classified (used for historical alarms) 1 = Severe 2 = Warning
Element 3 (D3)	Fault code from the PBC. *See Table 21 on page 204.* or Command that will be executed. *See Table 22 on page 204*.

Control Buttons

The push buttons on the display panel are used for:

– stepping through the fault codes.

– selecting commands.

Table 19 Control buttons on the display panel

Control button	Action
Up	Digit step up
Down	Digit step down
Menu	Activates command selection
Enter	Executes commands

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Fault messages

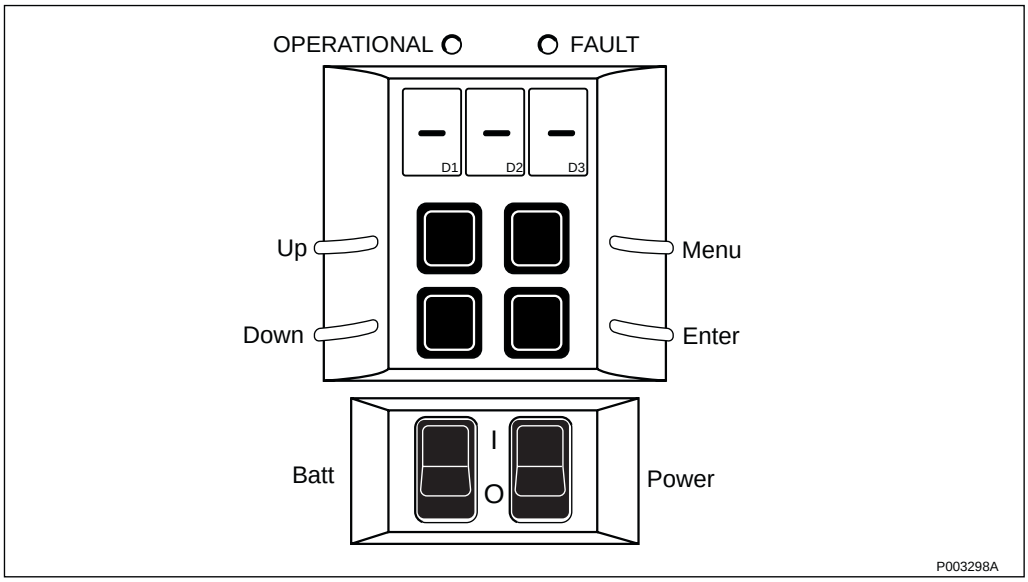

Figure 212 Display view if no faults are detected

- If there are no faults, this is indicated on the alarm display as shown in *Figure 212 on page 200*.
- If a fault occurs, the relevant fault code is automatically displayed, *see page 204*.
- To detect if there are several faults, step through the fault codes using the push buttons Up and Down, *see Table 19 on page 199*.

Except for temperature alarms, all alarm codes originate from active faults, that is, no fault history is stored.

8.4.4 Power Switches in the PBC

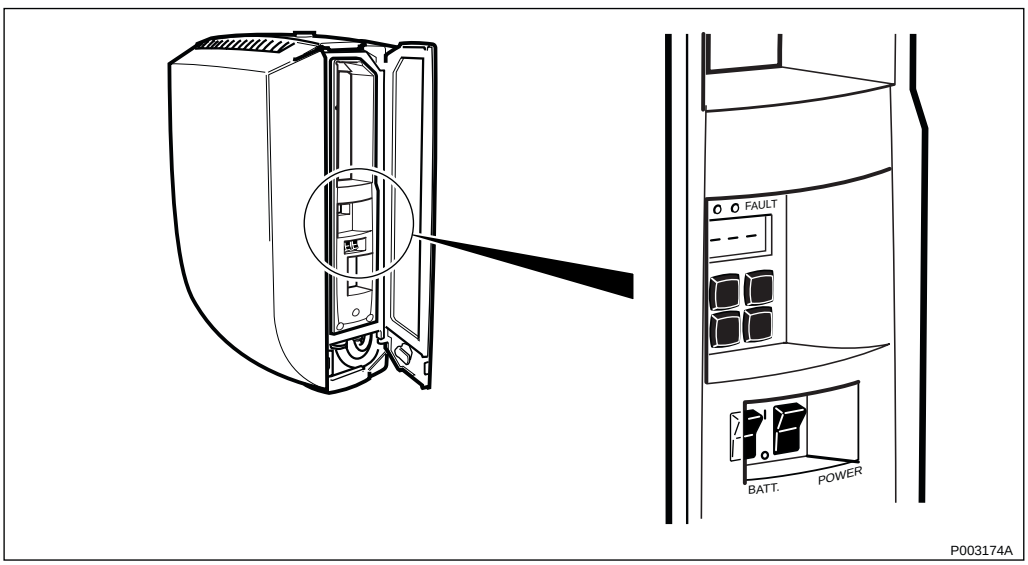

Figure 213 Location of power switches in the PBC

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DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

Note: When the AC power is turned off with the AC power switch in the PBC, there is still AC voltage both on the AC board in the interface box, and on the EMC board in the installation box up to the power switch.

8.5 Start-up and Shut-down

The purpose of this chapter is to give an overall description of the start-up and shut-down procedure.

For the location of power switches, *see Section 8.4.4 on page 200*(PBC), and *Section 8.3.5 on page 196* (RBS).

8.5.1 Start-up and shut-down of the RBS

If a PBC is used for battery backup, proceed to *Section 8.5.2 on page 202*.

How to Start-up

Make sure everything is connected according to *chapters Installation of RBS 2302* and *Installation of Power and Battery Cabinet.*

Also make sure that the transmission cable is disconnected. If not, and the software versions of the RBS and the BSC differ, the BSC will copy its software version to the RBS, without any warning.

At extremely low temperature, the warming up of the RBS may take about half an hour. During this time the RBSs leds in the interface box will turn off.

1. Switch on the AC power.
2. 2. Switch on the DC battery power.

The RBS will automatically run a self-test. For information regarding optical indicators on the user inteface:

– for the RBS, *see Section 8.3.3 on page 193.*

– for the PBC, *see page 198*

How to Shut-down

1. Switch off the DC battery power.
2. Switch off the AC power.

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8.5.2 Start-up and shut-down of the RBS and PBC

How to Start-up

Make sure everything is connected according to *chapters Installation of RBS 2302* and *Installation of Power and Battery Cabinet*.

Also make sure that the transmission cable is disconnected. If not, and the software versions of the RBS and the BSC differ, the BSC will copy its software version to the RBS, without any warning.

At extremely low temperature, the warming up of the RBS may take about half an hour. During this time the RBSs leds in the interface box will turn off.

Note: Always start–up the PBC before starting–up the RBS.

1. Start-up of the PBC:
    1. Switch on the AC power.
    2. Switch on the DC battery power.
    3. Check for PBC alarms, *see page 204*. If alarms are located, correct them before continuing.
2. Start-up of the RBS:
    1. Switch on the AC power.
    2. Switch on the DC battery power.

The RBS will automatically run a self-test. For information regarding optical indicators:

– for the RBS, *see Section 8.3.3 on page 193*.

– for the PBC, *see page 198*

How to Shut-down

Note: Always shut down the RBS before shutting off the PBC. If the antenna is to be dismounted, set the feeder attenuators to max. value. For further information, *see chapter Maintenance*.

1. Shut-down of the RBS:
    1. Switch off the DC battery power.
    2. Switch off the AC power.
2. Shut-down of the PBC:
    1. Switch off the DC battery power.
    2. Switch off the AC power.

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8.6 Alarms and Commands

8.6.1 Introduction

The purpose of this chapter is to give an overall description of the alarms and the alarm codes.

8.6.2 Power and Battery Cabinet (PBC)

Supervision of the PBC

The PBC alarms supervise:

- Main input AC power
- AC/DC converter
- DC/DC converter
- Battery unit
- Cabinet temperatures

Power up

When the power is switched on, the PBC display starts flashing. The power up takes about 5 seconds, then the active system status appears on the display.

PBC Originated Alarms to the RBS

All alarms transmitted to RBS are active alarms.

- Alarm terminals on the PBC

  The PBC has eight terminals for PBC alarms. Four of these are outgoing, used to connect the RBS. The remaining four terminals enable connection of incoming alarms from a second PBC.

- Alarm connected to the RBS

  The PBC alarm is connected to the RBS external alarm inputs, and generates the following alarm:

Alarm	Unit
POWER, WARNING	PBC

Note: The external alarm inlets on the RBS must be defined accordingly at installation, *see Section 8.11.3 on page 211*.

Stand Alone Mode

The PBC must be in Stand Alone Mode, as no active antenna is used. To set the PBC in Stand Alone Mode, *see page 205*.

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Alarm Codes

Table 20 Alarm classes on display element D2

Code	Alarm class
0	Not classified
1	Severe
2	Warning

Table 21 Fault codes on display element D3

Code	Fault
0	AC fault (no mains)
1	AC/DC fault
2	DC/DC overload
3	DC/DC fault
4	Battery fault
5	Battery disconnected
6	Battery voltage low
7	Overtemp active
8	Overtemp historical
9	PBC in standalone mode, antenna detected

Commands

The table below lists the command codes used for RBS 2302. Other codes are used for Maxite.

Table 22 Command codes on display element D3

Code	Command
5	Clear historical overtemperature alarms
6	Set PBC in stand alone mode
7	Exit PBC from stand alone mode

Clear Historical Temperature Alarms

There are two kinds of temperature alarms: active and historical.

Alarm code 008 on the display indicates “PBC Alarm, Overtemperature historical”

To reset the historical alarm:

1. Press Menu
2. Select code 5 on display element D3 with the Up or Down button.
3. Press Enter. The command is executed.

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Setting the PBC in Stand Alone Mode

Note: Always set the PBC in Stand alone Mode when active antenna is not used.

1. Press Menu.
2. Select code 6 on display element D3 with the Up or Down button.
3. Press Enter. The command is executed.

8.7 Connecting the OMT

The purpose of this chapter is to give a description of how to connect the Operation and Maintenance Terminal, OMT, to the RBS.

The configuration and fault status reading is performed with the OMT.

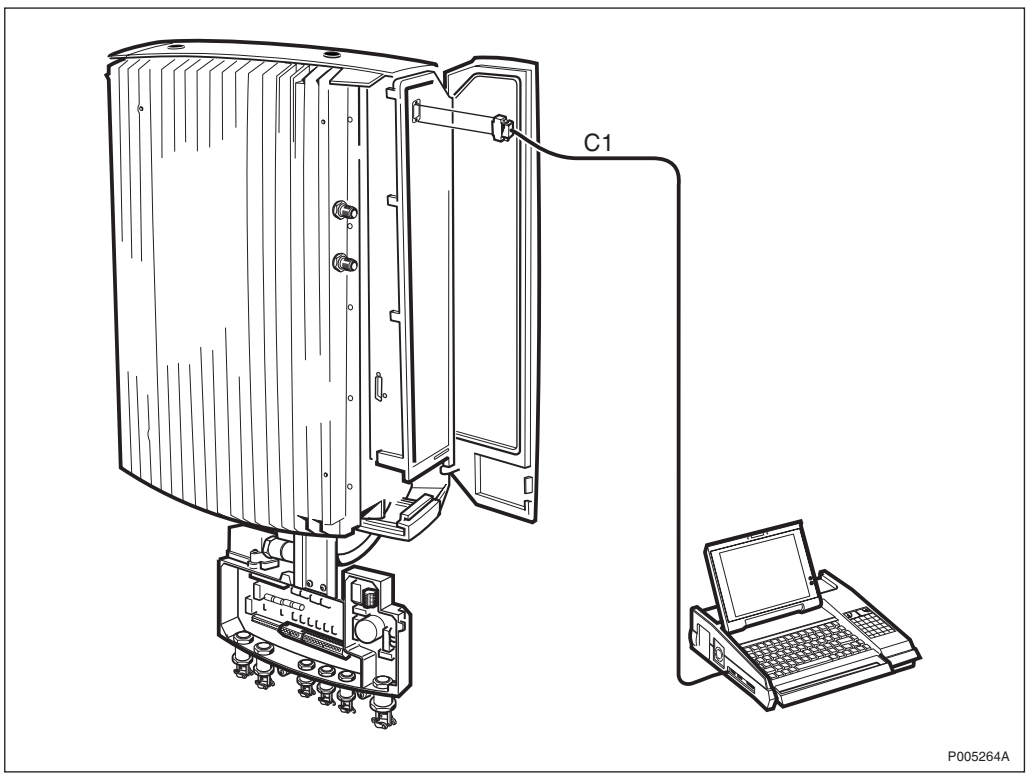

Figure 214 Connecting the OMT

When using the OMT, connect the OMT cable (C1) from a PC COM-port to the RBS according to the figure above.

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Extended OMT cable (optional)

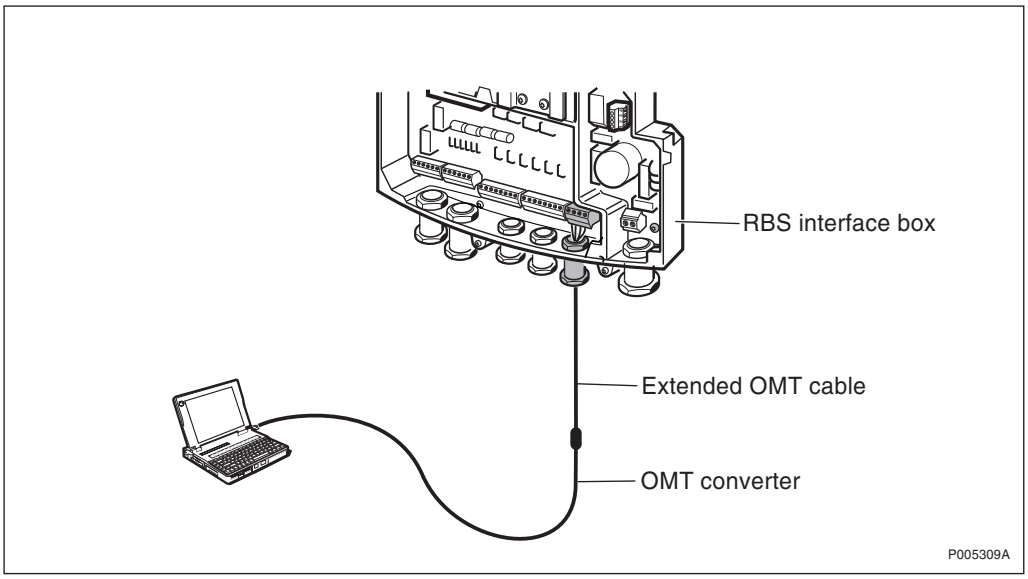

Figure 215 Test setup with extended OMT cable

An Extended OMT cable can be used for the 32 bits OMT, *see chapter Tools and Instruments*.

Connect the OMT converter between the Extended OMT cable and a PC, or BSC simulator, according to the figure above.

The OMT converter transforms the RS 422 standard to RS 232 standard.

8.8 Test Sequence

This chapter describes the recommended test sequence for the Site Installation Tests.

8.8.1 Preparations

Before performing any test, the tester must read through the *chapter Safety*, and follow the relevant safety instructions.

Tools and instruments

For information about required test equipment, tools and manuals, *see chapter Tools and Instruments*.

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8.8.2 Flowchart

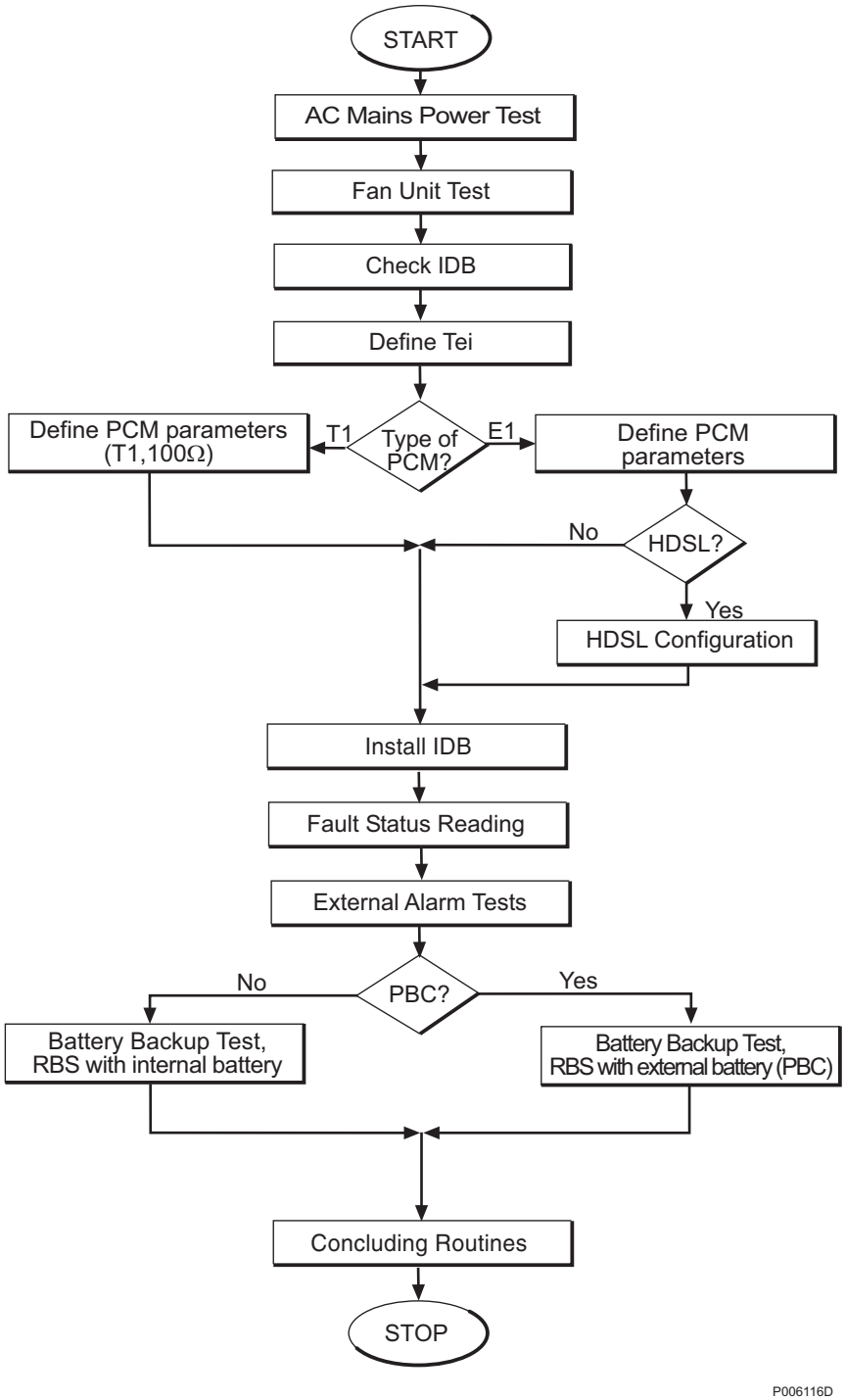

Figure 216 Flowchart

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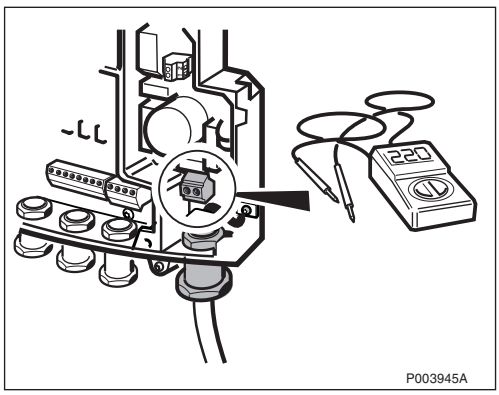
8.9 AC Mains Power Test

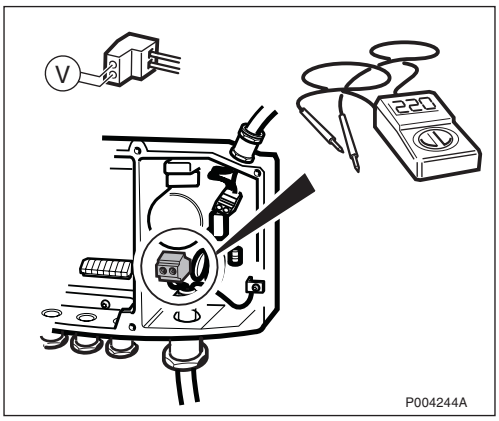
DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

1. Make sure that the correct nominal AC mains voltage (115/230 V) has been selected. See description in *chapter Product Data*.
2. Switch on the incoming AC Mains Power. (Make sure that all external AC switches are in ON position).
3. Measure with a multimeter to verify that the RBS has correct voltage on the AC terminal in the interface box.



4. Measure with a multimeter to verify that the PBC has correct voltage on the AC terminal in the interface box.



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8.10 Fan Unit Test

If a Fan Unit is used, perform the test according to the instructions below.

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

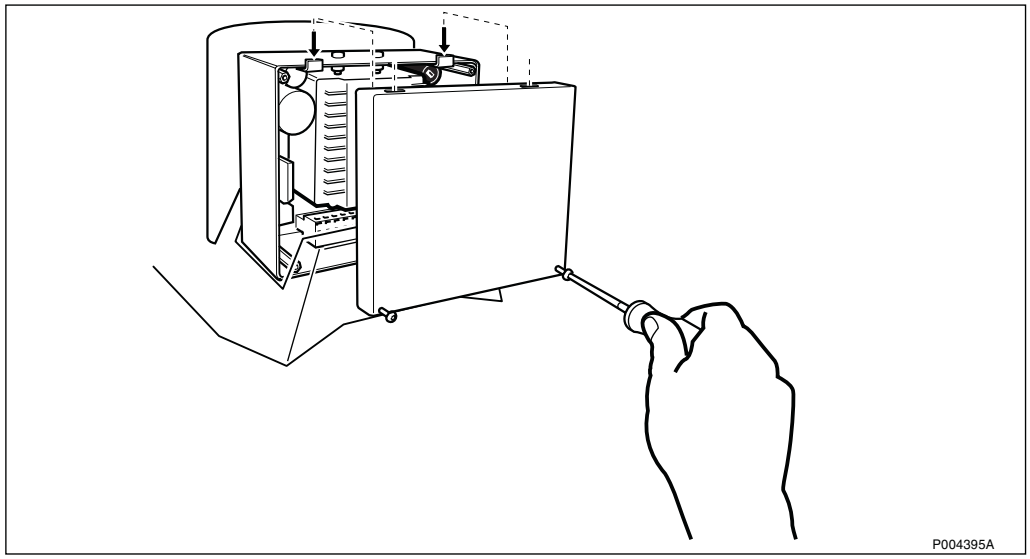

Figure 217 Removing the control box cover on the Fan Unit

1. Remove the control box cover on the Fan Unit by loosening the 2 screws.

2. Turn on the power for the Fan Unit.

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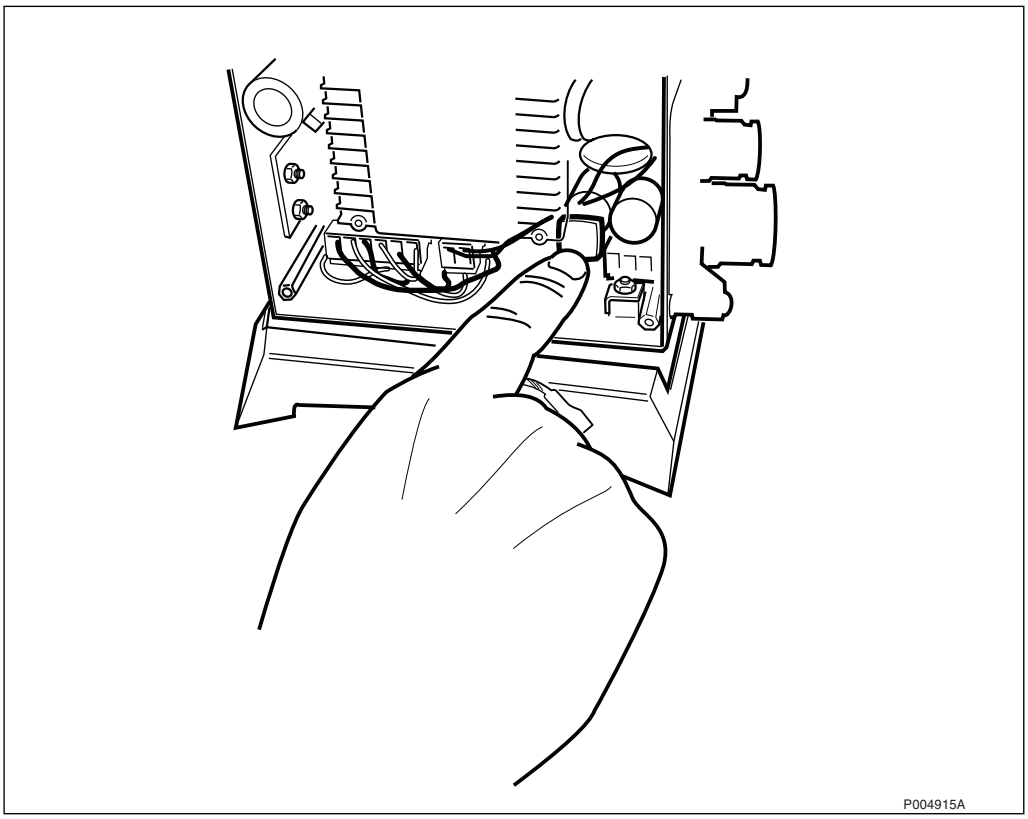

Figure 218 Location of the fan test button in the control box

3. Press the fan test button and check that all three fans are running. If not replace the Fan Unit according to *chapter Maintenance, section Corrective Action for the RBS, subsection Fan Unit (Optional).*

   If the temperature is above 30 °C the fans will still be running due to the hysteresis of the temperature sensor.

4. Remount the control box cover on the Fan Unit, and tighten the 2 screws.

8.11 Check IDB

Before starting any test, the RBS must have an Installation Database (IDB) that contains correct information about the equipment, and the configuration of the cabinet.

The IDB is essential to put the RBS into service.

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8.11.1 OMT related actions. Overview

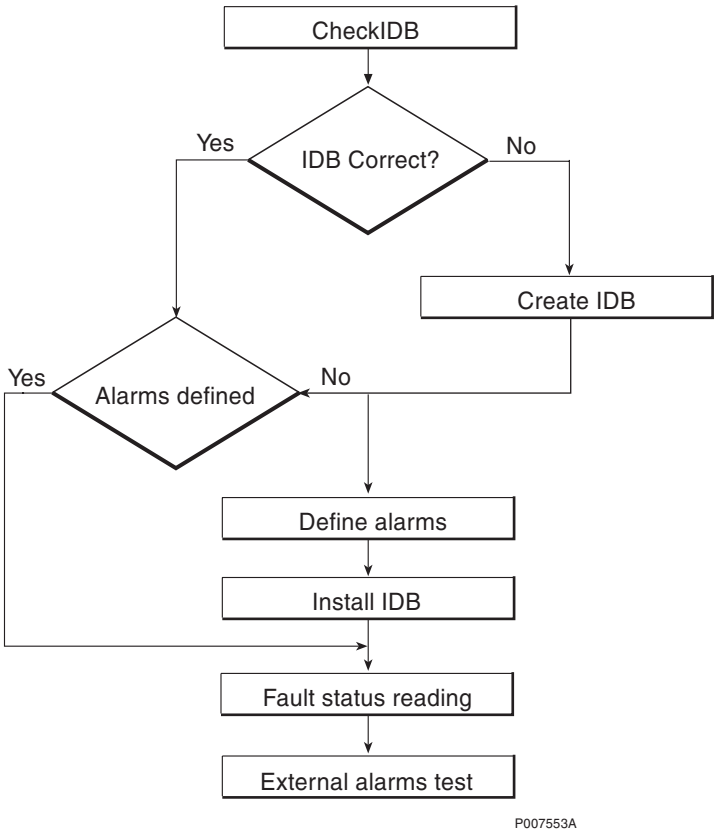

Figure 219 OMT related actions

8.11.2 Read IDB

Check with the OMT that the right IDB is installed in the RBS.

- If the IDB is correct, continue with *Section 8.17 Fault Status Reading on page 230*.
- If the IDB is incorrect, a new IDB must be created, see below.

8.11.3 Create IDB

The purpose is to create a new IDB if the current IDB is incorrect.

Example of parameters to be considered:

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- Transmission Parameters (PCM)
- Cabinet Type
- Power System
- Frequency Band
- TEI value
- Antenna type
- Site Cell Configuration
- TNOM parameters(1)
- Alarm Inlets

(1) BSS R7 or later

Note: When changing from regular RBS 2302 configuration to Maxite configuration or vice versa, do not reuse the old radio parameters in the OMT—window “Re-use Site Specific Data”.

1. Make sure that the OMT has been started and the IDB read. To create a new IDB the OMT must be in Disconnect mode.
2. Create IDB and define the setup parameters for the RBS. The description below explains how to define these parameters for 4 TRX and 6 TRX configurations.

Note: To be able to use 4 TRX or 6 TRX configuration the BSS R7 or later is needed.

4 TRX Configuration

- For 1x4 configuration, that is, one cell with two RBSs:

  Under Cabinet Setup, click New and define the first RBS. Click New again to define the second RBS.

  Under Antenna Sector Setup, click New only once and define the cell/sector.

- For 2x2 configuration, that is, two cells with one RBS in each cell:

  Under Cabinet Setup, click New and define the first RBS. Click New again to define the second RBS.

  Under Antenna Sector Setup, click New and define the first cell/sector. Click New again and define the second cell/sector.

6 TRX Configuration

- For 1x6 configuration, that is, one cell with three RBSs:

  Under Cabinet Setup, click New and define the first RBS. Click New again two times and define the second and the third RBS.

  Under Antenna Sector Setup, click New only once and define the cell/sector.

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- For 2x3 configuration, that is, three cells with one RBS in each cell:

  Under Cabinet Setup, click New and define the first RBS. Click New again two times and define the second and the third RBS.

  Under Antenna Sector Setup, click New and define the first cell/sector. Click New again two times and define the second and the third cell/sector.

Note: When using the SW Power Boost (TX-diversity) the OMT will show 2 TRXs, even though the RBS is to be considered as having only one TRX.

8.11.4 Define External Alarms for R6

Note: Make sure the RBS is in Local mode.

1. Make sure that the OMT is started, and IDB read.
2. Define Alarm Inlets.
   - If PBC is not used:
     - Continue with step 3.
   - If PBC is used:
     - Define the PBC alarm as an external alarm according to *Table 23 on page 213*. Other external alarms are to be defined on the remaining inlets.
   - If HDSL modem and/or Fan unit is not used:
     - Continue with step 3.
   - If HDSL modem and/or Fan unit is used:
     - Define Fan unit and HDSL modem alarms according to *Table 25 on page 214*, *Table 26 on page 215*, *Table 27 on page 215* and *Table 28 on page 215*. The use of external alarms for HDSL path supervision is optional and defined by the switch setting on the HDSL modem.
3. Define site specific alarm.

Table 23 PBC alarm

Alarm Inlet Info(1)	Type	ID(2)	Severity	Comment
8	Breaking		Level 2	PBC POWER, WARNING

(1) Recommended order.
(2) To be selected

8.11.5 Define External Alarms for R7

Note: Make sure the RBS is in Local mode.

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1. Make sure that the OMT is started, and IDB read.
2. Define Alarm Inlets.
   - If PBC is not used:
     - Continue with step 3.
   - If PBC is used:
     - Define the PBC alarm as an external alarm according to *Table 24 on page 214*. Other external alarms are to be defined on the remaining inlets.
   - If HDSL modem and/or Fan unit is not used:
     - Continue with step 3.
   - If HDSL modem and/or Fan unit is used:
     - Define Fan unit and HDSL modem alarms according to *Table 25 on page 214*, *Table 26 on page 215*, *Table 27 on page 215* and *Table 28 on page 215*. The use of external alarms for HDSL path supervision is optional and defined by the switch setting on the HDSL modem.
3. Define site specific alarm.

Table 24 PBC alarm

Alarm Inlet Info(1)	Type	ID(2)	Severity	Comment
RBS 1				
0/8	Breaking		Level 2	PBC POWER, WARNING
RBS 2				
1/8	Breaking		Level 2	PBC POWER, WARNING
RBS 3				
2/8	Breaking		Level 2	PBC POWER, WARNING

(1) Recommended order.
(2) To be selected

8.11.6 Define External Alarm: Fan Unit for R6 and R7

If a fan unit is used, the fan alarm can be defined according to *Table 25 on page 214* (R6) and *Table 26 on page 215*(R7).

Table 25 Fan alarm for R6

Alarm Inlet Info	Type	ID	Severity	Comment
2	Breaking		Level 2	FAN UNIT

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Table 26 Fan alarm for R7

Alarm Inlet Info	Type	ID	Severity	Comment
RBS 1				
0/2	Breaking		Level 2	FAN UNIT
RBS 2				
1/2	Breaking		Level 2	FAN UNIT
RBS 3				
2/2	Breaking		Level 2	FAN UNIT

8.11.7 Define External Alarm: HDSL for R6 and R7

If a HDSL modem is used, the HDSL alarm can be defined according to *Table 27 on page 215* (R6) and *Table 28 on page 215*(R7).

Table 27 HDSL alarm for R6

Alarm Inlet Info	Type	ID	Severity	Comment
3	Closing		Level 2	HDSL DEGRADATION DOWNSTREAM OR PAIR 1
4	Closing		Level 2	HDSL DEGRADATION UPSTREAM OR PAIR 2

Table 28 HDSL alarm for R7

Alarm Inlet Info	Type	ID	Severity	Comment
0/3	Closing		Level 2	HDSL DEGRADATION DOWNSTREAM OR PAIR 1
0/4	Closing		Level 2	HDSL DEGRADATION UPSTREAM OR PAIR 2

8.12 Define Tei

When cascading two or more RBSs, more than one Transceiver Group (TG) is connected to the same DIP. Each TG, which is on the same DIP, must have a unique CF TEI value. The TEI value must be changed with the OMT. See instruction in:

OMT User's Manual *LZN 302 01*

1. Make sure that the OMT is started, and IDB read.
2. Define TEI, see correct address in network data. Make sure the BSC has the corresponding TEI value.

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8.13 Define PCM Parameters (E1, 120 ohm)

The purpose is to configure the RBS for stand alone mode or cascade connection and to define the E1 transmission parameters using the OMT.

For more information about how to use the OMT see:

OMT User's Manual *LZN 302 01*

The following parameters must be considered when defining the PCM transmission.

- Transmission Interface (E1)
- Network Topology
- Sync Source
- E1 Receiver Sensitivity Parameters (Short Haul/ Long Haul)

The purpose of Short Haul or Long Haul Receiver Sensitivity settings is to configure the RBS for Short Haul/Long Haul transmission to optimize the transmission line performance.

Long Haul makes it possible to use longer cables for transmission between the RBS and the Far End or between RBSs in multidrop configurations.

The Long Haul functionality is accomplished by high sensitivity in the receiver. The receiver dynamic range is 0 to - 30 dB at 1024 Hz for 120 ohms twisted pair cables (0 dB = 6.0 Vp-p). With Short Haul the receiver sensitivity is - 6 dB. The maximum cable length is calculated as:

Max. cable length = Receiver sensitivity/Cable attenuation per metre.

To take advantage of the Long Haul function the Far End, for example a DXX, Mini DXC, BSC or another RBS must support Long Haul. If two equipments are connected together, the equipment with the least sensitive receiver determines the maximum attenuation of the cables that can be used.

The default value is Long Haul and can be used for all cable lengths (cable attenuation 0 - 30 dB). If cables used have an attenuation less than 6 dB, Short Haul can be used to avoid noise and cross talk to interfere with the signal.

8.14 Define PCM Parameters (T1, 100 ohm)

The purpose is to configure the RBS for stand alone mode or cascade connection and to define the T1 transmission parameters using the OMT.

For more information about how to use the OMT see:

OMT User's Manual *LZN 302 01*

The following parameters must be considered when defining the PCM transmission.

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- Transmission Interface (T1)
- Network Topology
- Sync Source
- T1 LBO Parameters (Short Haul/ Long Haul)

The purpose of LBO parameter settings is to configure the RBS for Short Haul/Long Haul transmission to optimize the transmission line performance and to reach the signal level stated by the network operator.

The choice between Short Haul and Long Haul is depending on the maximum input level at the Far End/Network Interface specified by the network operator and the length of the transmission line.

The Short Haul functionality includes the possibility to amplify the output signal. This is used to adapt the line signal to optimize the transmission line performance in the range 0 - 655 feet. The dynamic range of the receiver in Short Haul mode is + 3 to - 6 dB at 772 kHz.

The Long Haul functionality provides higher sensitivity in the receiver compared with Short Haul. The receiver dynamic range is 0 to - 30 dB at 772 kHz in Long Haul mode. In addition the output signal can be attenuated with an LBO (Line Build Out). The LBO can be used in manual or automatic mode. In both modes the output signal can be attenuated in standardized steps of 7.5 dB between 0 and - 22.5 dB.

8.14.1 Defining Short Haul parameters

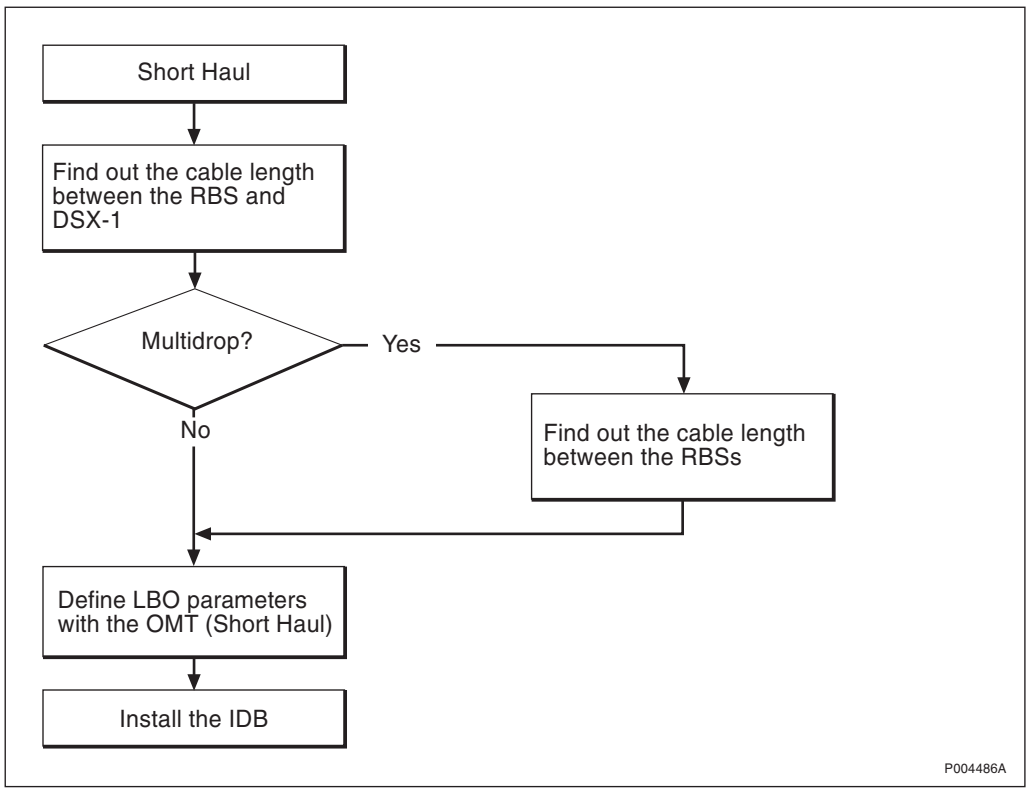

Figure 220 Defining Short Haul (0 - 655 feet)

The purpose of the Short Haul functionality is to reach a signal level of 0 dB at the DSX-1 cross-connect point.

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The length of the cable between the RBS and the DSX-1 must be known to be able to perform Short Haul. If DSX-1 is not used, choose 0-133 feet.

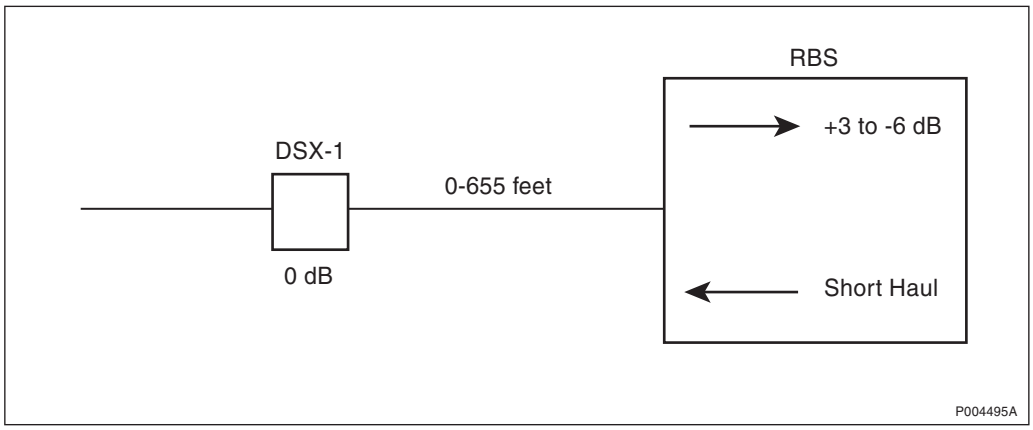

Figure 221 The Short Haul principle

In order to reach 0 dB at the cross-connect point (DSX-1 level), the PCM port output signal can be amplified in five different levels. In the OMT the signal level is chosen according to the cable length between the RBS and the DSX-1 interface. The reference cable is a multi-pair 22 AWG office cable with overall outer shield. The following values are supported:

- 0-133 feet
- 133-266 feet
- 266-399 feet
- 399-533 feet
- 533-655 feet

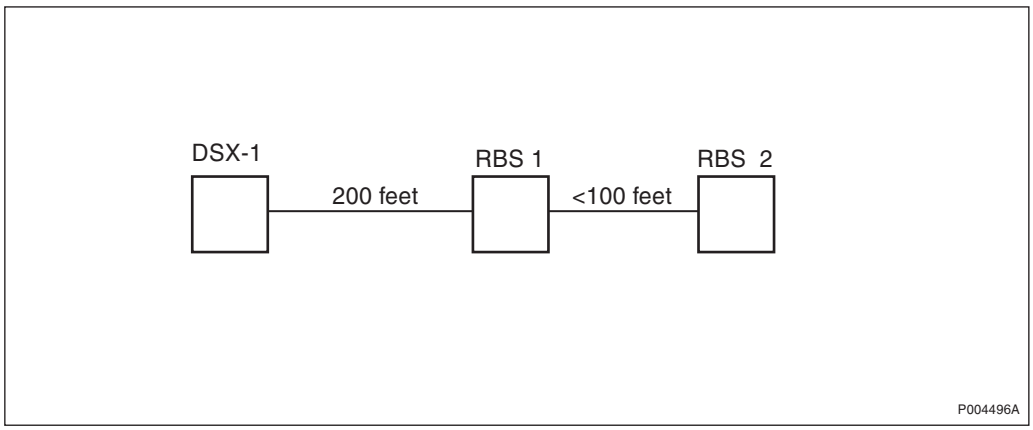

Figure 222 The Short Haul Multidrop principle

Example:

LBO parameters for RBS 1:

- LBO A: Short h; 133–266 feet
- LBO B: Short h; 0–133 feet

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LBO parameters for RBS 2:

- LBO A: Short h; 266–399 feet
- LBO B: Short h; 0–133 feet

8.14.2 Defining Long Haul parameters

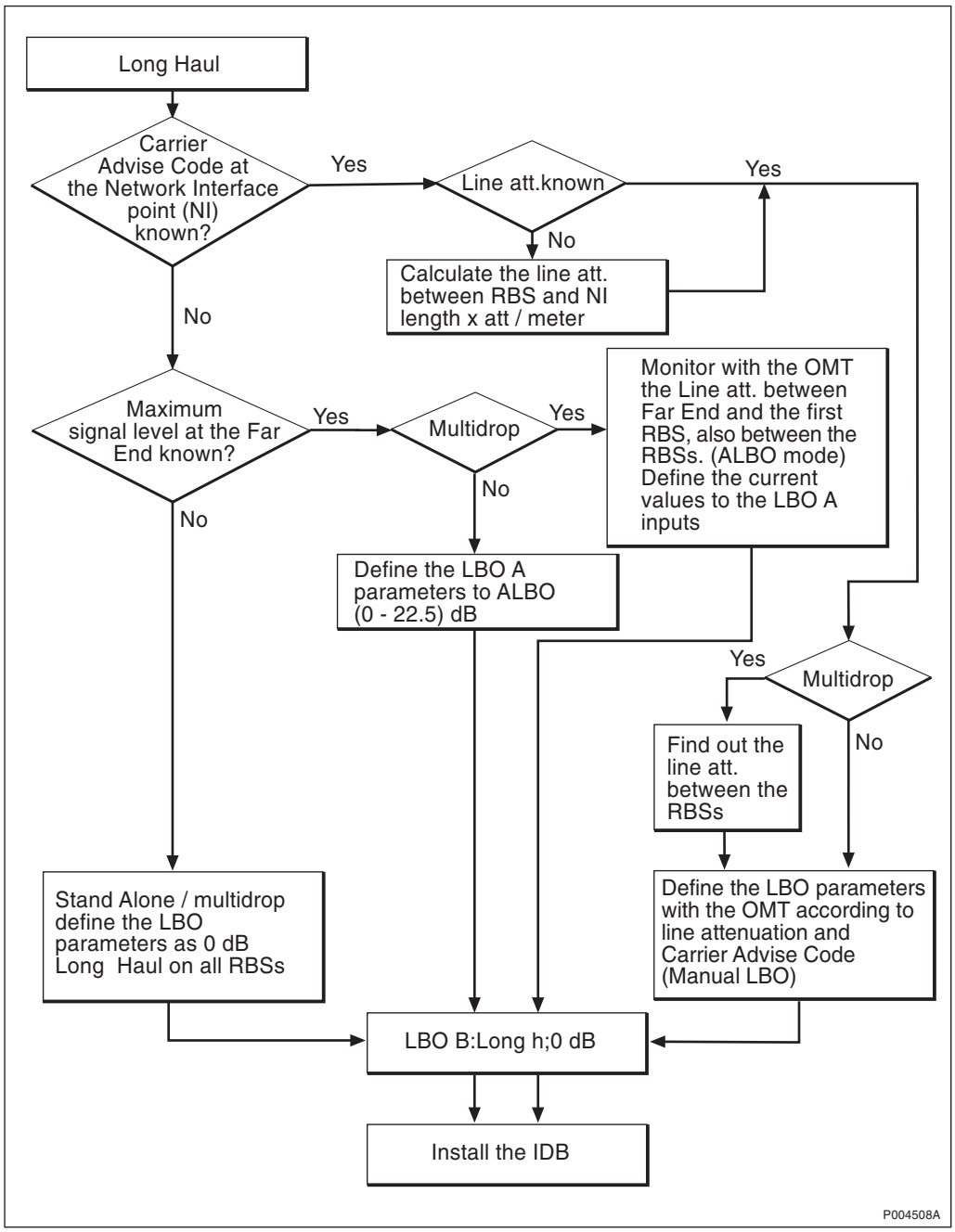
Long Haul
Carrier Advise Code at the Network Interface point (NI) known?
Yes
Line att.known
Yes
No
Calculate the line att. between RBS and NI length x att / meter
No
Maximum signal level at the Far End known?
Yes
Multidrop
Yes
Monitor with the OMT the Line att. between Far End and the first RBS, also between the RBSs. (ALBO mode) Define the current values to the LBO A inputs
No
No
Define the LBO A parameters to ALBO (0 - 22.5) dB
Yes
Multidrop
No
Find out the line att. between the RBSs
Stand Alone / multidrop define the LBO parameters as 0 dB Long Haul on all RBSs
Define the LBO parameters with the OMT according to line attenuation and Carrier Advise Code (Manual LBO)
LBO B:Long h;0 dB
Install the IDB
P004508A

Figure 223 Defining Long Haul (> 655 feet)

The purpose of Long Haul is to optimize line performance.

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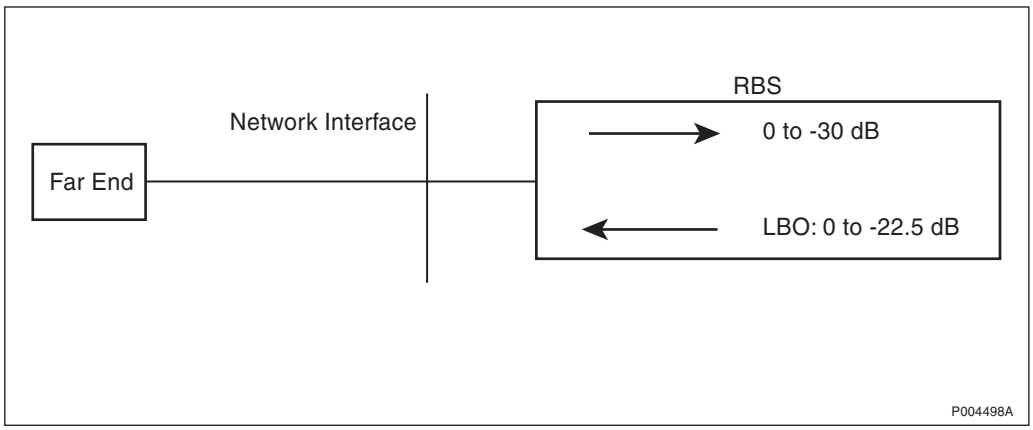

Figure 224 Long Haul

Long Haul makes it possible to transmit and receive over longer distances than Short Haul without additional transmission equipment.

The Long Haul functionality is accomplished by high sensitivity in the receiver. The receiver dynamic range is from 0 down to -30 dB. To cope with noise, a margin should be used.

For T1 it is also possible to attenuate the output signal with LBO.

LBO is used to avoid overloading the receiver at the Far End, and to minimise cross talk.

To take advantage of Long Haul the transmission equipment in both ends must support Long Haul functionality. If two equipments are connected together, the equipment with the least sensitive receiver determines the maximum attenuation of the cables that can be used.

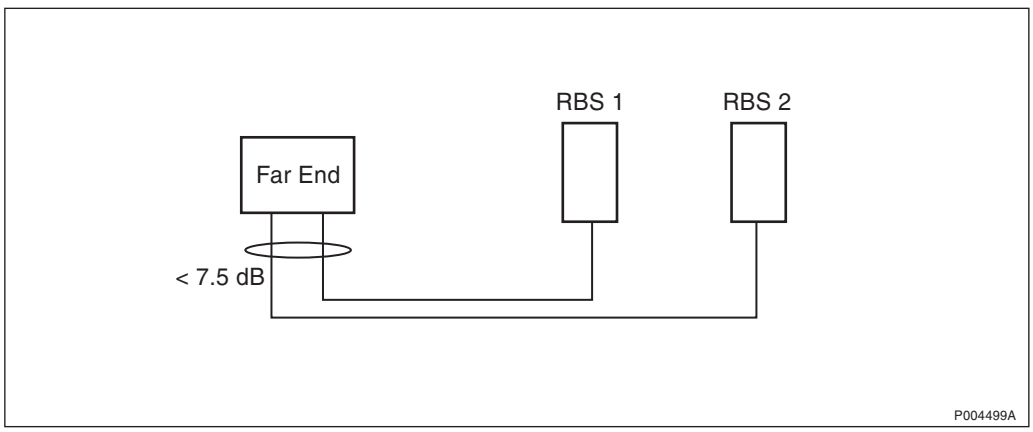

Figure 225 Line Build Out

Line Build Out is only used for T1 transmission interface in Long Haul cases.

Line Build Out should not be mixed up with LBO parameters, which are defined with the OMT.

Line Build Out is the possibility to attenuate the output signal sent from the RBS.

The purpose of Line Build Out is to reduce cross talk and to be able to send signals to different kind of Far Ends. For example, if two RBSs are at different distances from the Far End, the signal received from the

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closest RBS is to be much stronger than the signal received from the RBS far away. To minimise cross talk at the Far End, the output signal from the closest RBS is attenuated. With this, the input signal from both RBSs is kept at the same level at the Far End.

Manual LBO for Carrier Advised Code

In order to manually set the LBO attenuation values in the OMT, the operator has to know:

- Carrier Advised Code at the Network Interface (NI).
- Line attenuation for the customer cable between the RBS and the NI.

Example:

See Table 29 on page 221.

Carrier Advise Code at NI is -7.5 dB,

Line Attenuation between the RBS and the NI is 12 dB.

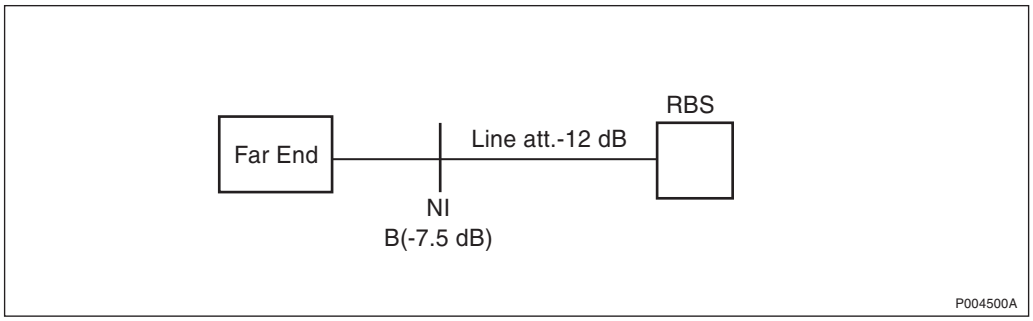

Figure 226

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

The port B outputs should always have LBO 0 dB (Long h., 0 dB) attenuation for all RBSs.

Table 29

Line Attenuation (dB)	Carrier Advise Code at NI (dB)			
	A (0 dB)	B (-7.5 dB)	C (-15 dB)	D (-22.5 dB)
0-5.5	0	-7.5	-15	-22.5
7.5-13	N/A	0	-7.5	-15
15-20.5	N/A	N/A	0	-7.5
22.5-	N/A	N/A	N/A	0

Manual LBO for maximum input signal level at the Far End

In order to manually set the LBO attenuation values in the OMT, the operator has to know:

- Maximum input signal level of the equipment at the Far End.

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- Line attenuation between the RBS and the Far End.

The Line attenuation should be either calculated or measured. The LBO value is calculated as follows:

Maximum output level = Maximum input signal level at the Far End + Line attenuation.

The LBO standard value with the next higher attenuation is chosen.

Example:

Far End permits a signal level of max. -22.5 dB and the Line Attenuation has been measured to 9 dB. Max. output level from the RBS is - 22.5 + 9 = -13.5 dB. The LBO is set to -15 dB. See Table 30 on page 222.

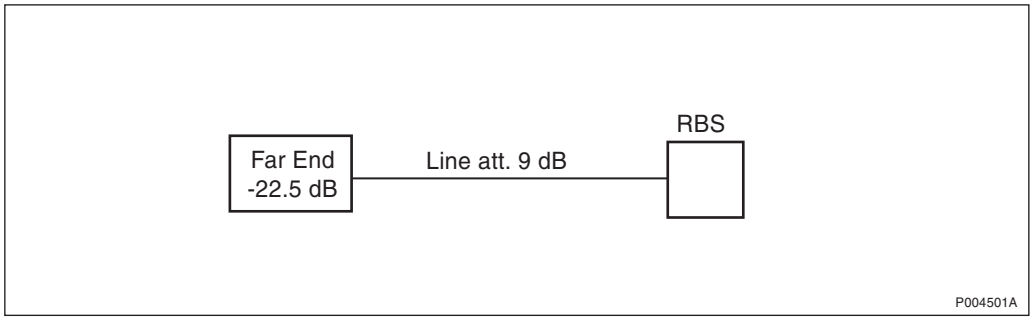

Figure 227

- LBO A: Long h; -15 dB
- LBO B: Long h; 0 dB

Table 30

Line Attenuation (dB)	Maximum signal level at Far End (dB)			
	0	-7.5	-15	-22.5
0 - 7.5	0	-7.5	-15	-22.5
7.5 - 15	0	0	-7.5	-15
15 - 22.5	0	0	0	-7.5
22.5 -	0	0	0	0

Example:

If none of the following are known, Carrier Advise Code, Line Attenuation or maximum input level at the Far End.

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

Automatic LBO for Long Haul

Automatic LBO (ALBO) is used for T1 transmission interface in Long Haul cases. If maximum input signal level at the Far End is known, use this value to set the ALBO in the OMT.

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ALBO is to be used also when the Carrier Advised Code and Line attenuation are not known.

The received signal level is measured at the PCM port of the RBS. The output signal from the Far End is always assumed to be 0 dB.

1. The received signal is measured and the Line Attenuation is calculated in the RBS and can be monitored with the OMT. The displayed value is in deci dB (10 deci dB = 1 dB).
2. From the Line Attenuation and the maximum input signal level at the Far End appropriate LBO value is set automatically.

Example for Stand Alone:

The maximum input signal level at the Far End is: -15 dB, Line Attenuation is not known.

- LBO A: Long h; ALBO –15 dB
- LBO B: Long h; 0 dB

Example for Multidrop:

The maximum input signal level at the Far End is: -15 dB, Line Attenuation is not known.

Settings in order to find out the line attenuation between RBS 1 and RBS 2:

	RBS 1	RBS 2
LBO A	Long h; ALBO –15 dB	Long h; ALBO 0 dB
LBO B	Long h; 0 dB	Long h; 0 dB

To enable measuring the line attenuation, RBS 2 must be reset.

The measurement result can be monitored with the OMT.

When the measurement is completed, change to manual LBO and use the values according to Table 30 on page 222.

Manual LBO with Multidrop

The purpose of setting the LBO parameters in multidrop configurations is to assure that the signal level will not be affected if one, or several, of the RBSs are in Bypass State (powered off or reset), .

Automatic or manual LBO can be used between the Far End and RBS 1 port A as in the Stand Alone case. The LBO at port A in the other RBSs must be set manually.

The LBO parameter at port A of RBS 2 should be set as if RBS 1 was in Bypass State. For Carrier Advised Code at the Network Interface point, the Line Attenuation is the Line Attenuation between the NI and the RBS 1 added to the Line Attenuation between RBS 1 and RBS 2.

For a maximum input signal level at the Far End, the total Line Attenuation is the Line Attenuation between the Far End and the RBS 1 added to the Line Attenuation between RBS 1 and RBS 2.

The port A of RBS 3 is set as if RBS 1 and RBS 2 were in Bypass State, and so on.

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The port B outputs should always have LBO 0 dB (Long h., 0 dB) attenuation for all RBSs.

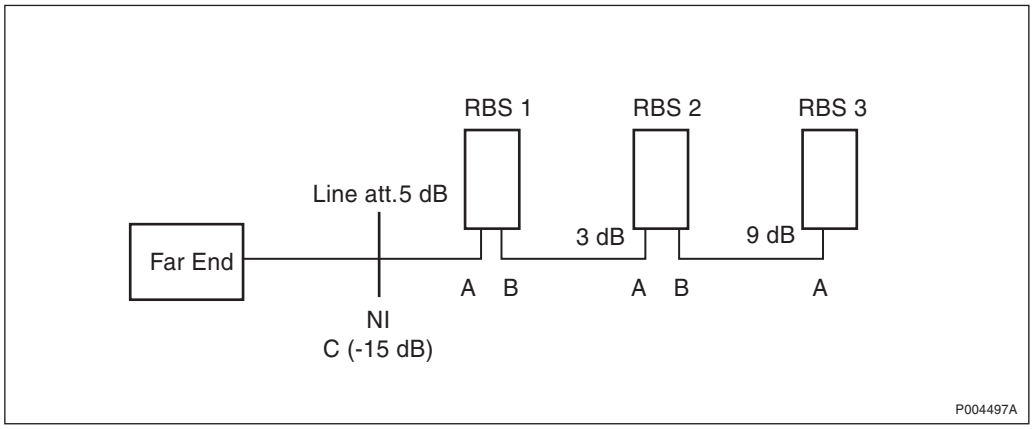

Figure 228

Example 1 of multidrop using manual LBO parameters:

RBS 1: Carrier Advise Code at NI (-15 dB) and Line Attenuation (5 dB).

RBS 2: Line Attenuation between RBS 1 and RBS 2 (3 dB) + Line Att. between RBS 1 and NI (5 dB) = 8 dB.

RBS 3: Line Attenuation between RBS 2 and RBS 3 (9 dB) + Line Att. between RBS 2 and RBS 1 (3 dB) + Line Att. between RBS 1 and NI (5 dB) = 17 dB.

See Table 29 on page 221.

LBO parameters for RBS 1:

- LBO A: Long h; –15 dB
- LBO B: Long h; 0 dB

LBO parameters for RBS 2:

- LBO A: Long h; – 7.5 dB
- LBO B: Long h; 0 dB

LBO parameters for RBS 3:

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

Example 2 of multidrop using LBO parameters:

When none of the following are known, Carrier Advise Code, and Line attenuation or maximum input signal at the Far End presume that the max. signal at the Far End is 0 dB. Use the following parameters for all RBSs:

- LBO A: Long h; 0 dB
- LBO B: Long h; 0 dB

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8.15 HDSL Configuration

The purpose is to configure the DIP (Digital Path) switches for the HDSL modem.

If several RBSs with HDSL modems are used, each HDSL modem has to configured separately according to the transmission used for that RBS.

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

8.15.1 Link configuration

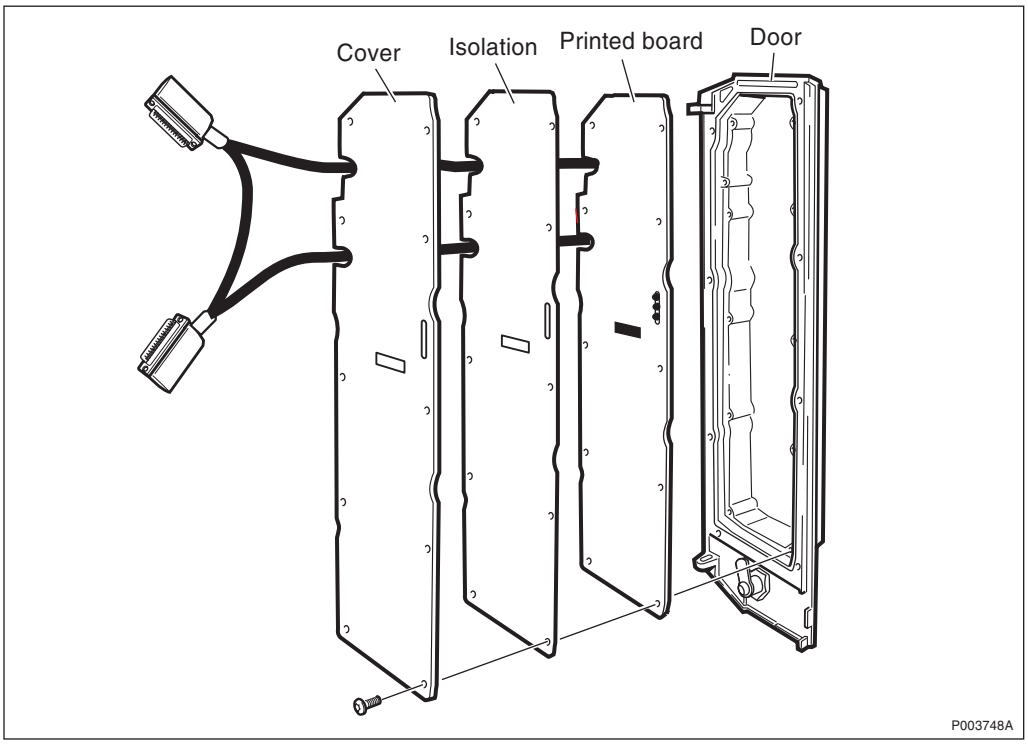

Figure 229 Mounting and demounting of HDSL modem module in the HDSL door

At pre-installation an HDSL link can be established upstream, downstream or in both directions. The other link is established with a PCM connection which is then directly bypassed from the radio cabinet G.703 interface to the RBS line interface. The choice or configuration is made by choosing one of the three possible connectors in both the line interface (J2, J4 and J6) and the G.703 interface (J1, J3 and J5) of the module. *Table 31 on page 226*states the link choice as a function of the selected connector.

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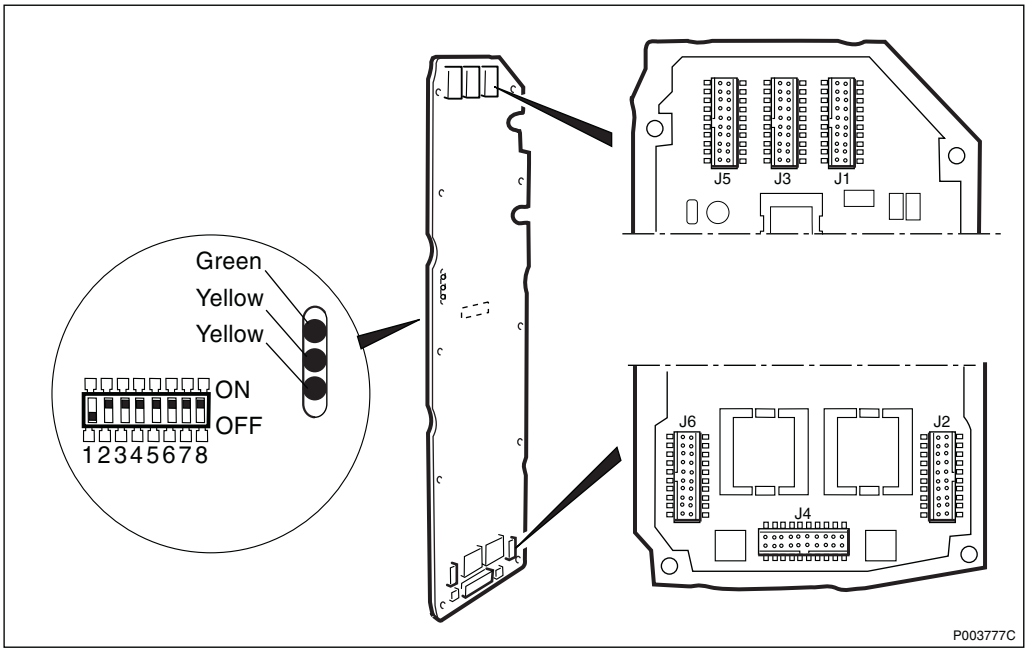

Figure 230 Location of DIP switches, LEDs and connectors

Table 31 Connector selections for the different link choices

	HDSL modem		
Configurations	**Connectors**	**DIP switches[1)]**	**LEDs**
HDSL upstream, one pair	J1 and J2	*Table 34 on page 228*	On, On, Off
HDSL upstream, two pairs	J1 and J2	*Table 34 on page 228*	On, On, On
HDSL upstream, one pair-PCM downstream	J1 and J2	*Table 34 on page 228*	On, On, Off
HDSL upstream, two pairs-PCM downstream	J1 and J2	*Table 34 on page 228*	On, On, On
HDSL upstream-HDSL downstream (cascade)	J3 and J4	*Table 33 on page 227*	On, On, On
PCM upstream-HDSL downstream, one pair	J5 and J6	*Table 34 on page 228*	On, Off, On
PCM upstream-HDSL downstream, two pairs	J5 and J6	*Table 34 on page 228*	On, On, On

[1)]For ETSI *see Table 35 on page 229.*

Default settings are J3 and J4.

If the configuration has been changed the marking of the cover must be updated.

8.15.2 LED Indicators

The LEDs of the HDSL Modem Unit has the following functions:

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Table 32 The indications of the LEDs

LED	LED On		LED Off
	Steady Light	**Flashing Light**	
Green	Power ON	[1]	Power OFF
Upper Yellow, upstream or Pair 2	Link operational	Filter tuning in progress	Link break or not in use
Lower Yellow, downstream or Pair 1	Link operational	Filter tuning in progress	Link break or not in use

[1] A faulty configuration (inconsistent settings of the DIP switches) will be indicated by flashing of all three LEDs simultaneously.

8.15.3 Strapping

Following tables summaries the settings of the DIP-switches in different modes.

Table 33 The chain (cascading) mode strappings

Function	Switch position			Parameter value
	SW 1			
Topology	OFF			chain
	SW 2	**SW 3**		
Line rate of master modem in chain mode	ON	ON		2320 kbit/s
	OFF	ON		1168 kbit/s
	ON	OFF		592 kbit/s
	OFF	OFF		reserved
	SW 4	**SW 5**	**SW 6**	
Running number of RBS in the chain mode	ON	ON	ON	RBS number 1
	OFF	ON	ON	RBS number 2
	ON	OFF	ON	RBS number 3
	OFF	OFF	ON	RBS number 4
	ON	ON	OFF	RBS number 5
	OFF	ON	OFF	RBS number 6
	ON	OFF	OFF	RBS number 7
	OFF	OFF	OFF	RBS number 8
	SW 7			
Reserved in chain mode	ON			Not applicable
	SW 8			
Usage of external alarm	ON			External alarms used by HDSL module
	OFF			External alarms

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Table 34 The point-to-point DXX proprietary mode strappings

Function	Switch position		Parameter value
	SW 1		
Topology	ON		point-to-point
	SW 2	**SW 3**	
Line rate in point-to point DXX proprietary mode	ON	ON	2320 kbit/s
	OFF	ON	1168 kbit/s
	ON	OFF	592 kbit/s
	OFF	OFF	reserved
	SW 4		
HDSL operation in point-to-point mode	ON		Proprietary mode
	SW 5		
Number of pairs in point-to-point DXX proprietary mode	ON		1 pair used
	OFF		2 pairs used
	SW 6		
Protection in point-to-point proprietary mode	ON		No protection
	OFF		1 + 1 protection used
	SW 7		
Modem role in point-to-point mode	ON		HDSL Master
	OFF		HDSL Slave
	SW 8		
Usage of external alarm	ON		External alarms used by HDSL module
	OFF		External alarms

Note: The HDSL 1+1 protection mode selection (SW 6) is independent from the link type selection but is only available in 2 pair mode.

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Table 35 The point-to-point ETSI compliant mode strappings

Function	Switch position		Parameter value
	SW 1		
Topology	ON		point-to-point
	SW 2	**SW 3**	
Line rate point-to point ETSI compilant mode	ON	ON	1 x 2 Mbit/s
	OFF	ON	2 x 1 Mbit/s asynchronous
	ON	OFF	2 x 1 Mbit/s synchronous
	OFF	OFF	2 x 1 Mbit/s partial
	SW 4		
HDSL operation in point-to-point mode	OFF		ETSI compliant mode
	SW 5		
Reserved in ETSI compliant mode	ON		Not applicable
	SW 6		
Reserved in ETSI compliant mode	ON		Not applicable
	SW 7		
Modem role in point-to-point mode	ON		HDSL Master
	OFF		HDSL Slave
	SW 8		
Usage of external alarm	ON		External alarms used by HDSL module
	OFF		External alarms

8.15.4 Test of HDSL

Perform the optional test for the HDSL modem according to *chapter Optional Tests*.

8.15.5 Start-up

After start-up of the PBC and the RBS, check that the green LED of the HDSL Modem will light steady. Wait for the yellow LEDs to go from flashing to steady light. One or two LEDs will light depending on the configuration according to the *Table 32 on page 227*.

8.16 Install IDB

Note: The RBS has to be in Local mode to accept a new or modified IDB.

If necessary, change mode by pressing the Local/Remote button.

2 TRX configuration

1. Connect the OMT to the RBS. (See Section 8.7 on page 205.)

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2. Establish a link between the OMT and the RBS.
3. Make sure that the RBS is in Local mode.
4. Install the IDB. The RBS should remain in Local mode after the IDB has been installed.
5. Using the OMT, check that the PCM Parameters and the defined alarms are properly installed.
6. Set the RBS in Remote mode.

4 and 6 TRX configuration

When a 4 TRX or 6 TRX configuration is used, the IDB should only be installed in the Master RBS before switching on any Extension RBS.

1. Connect the OMT to the Master RBS. (See Section 8.7 on page 205.)
2. Make sure that the Extension RBS(s) are switched off.
3. Establish a link between the OMT and the Master RBS.
4. Make sure that the Master RBS is in Local mode.
5. Install the IDB. The Master RBS should remain in Local mode after the IDB has been installed.
6. Switch on the Extension RBS(s). The Extension RBS(s) will now enter Local mode.
7. Wait for a few minutes, then set the Extension RBS(s) in Remote mode.
8. Using the OMT, check that the Master RBS has established contact with the Extension RBS(s) by viewing the SW-revisions for all RBSs.
9. Using the OMT, check that the PCM Parameters and the defined alarms are properly installed.
10. Set the Master RBS in Remote mode.
11. Make sure that all RBSs are in Remote mode.

8.17 Fault Status Reading

If any fault LED is lit, including the external alarms LED, the fault status must be read.

1. Make sure that the OMT is started, and IDB read.
2. Read the faults with the OMT.
3. If needed, *see chapter Fault Handling*, to decode the faults in the Event Monitor field.
4. Take corrective action.

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8.18 External Alarm Tests

This test is to be performed now if it will not be done later during the integration.

The purpose of this test is to make sure that the external alarms are recognised and handled correctly. The test is passed when all defined alarms are recognised.

The external alarms are specified individually for each site.

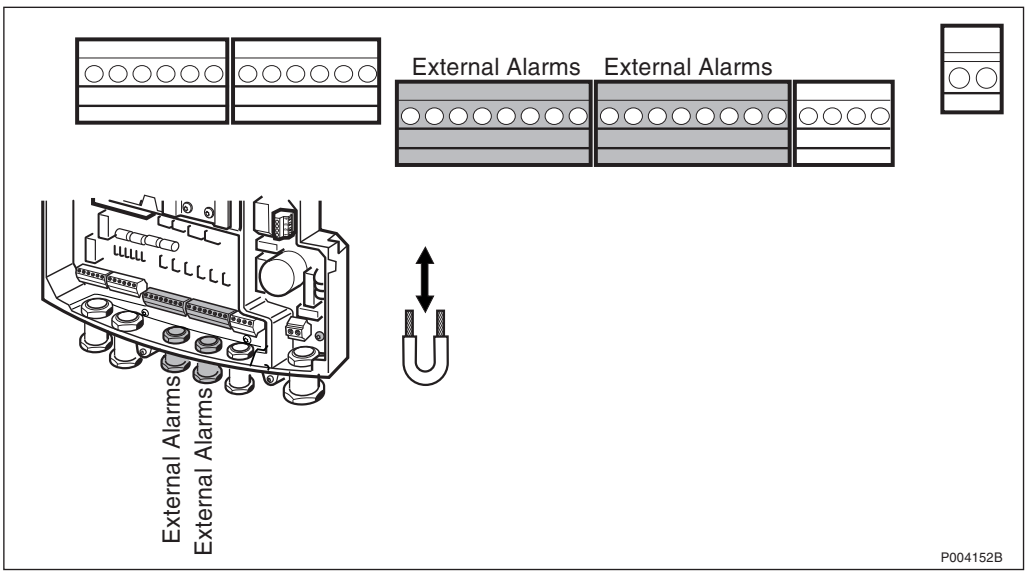

Figure 231 Test of closing alarm

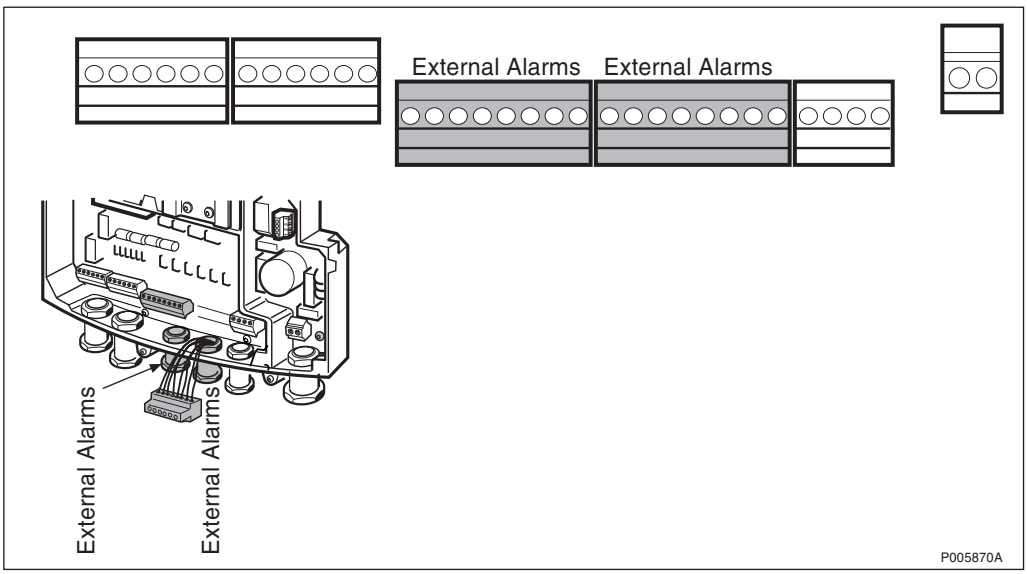

Figure 232 Test of breaking alarm

For an explanation of the indicators *see Section Explanation of the Indicators on page 194.*

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8.18.1 External Alarm Test, 2 TRX Configuration

1. Activate an alarm by applying appropriate closing or breaking depending on definition. The Alarm connectors are located in the interface box.
2. The external alarm indicator will now be lit.
3. Check with the OMT that the appropriate alarm appears.
4. Deactivate the alarm applied in step 1 so that no faults are indicated.
5. The external alarm indicator on the distribution panel will be off.
6. Repeat steps 1 to 5 for all alarms.

8.18.2 External alarm test on RBS 1, 4 TRX and 6 TRX Configurations

1. Activate an alarm by applying appropriate closing or breaking depending on definition. The Alarm connectors are located in the interface box.
2. The external alarm indicator will now be lit.
3. Check with the OMT that the appropriate alarm appears.
4. Deactivate the alarm applied in step 1 so that no faults are indicated.
5. The external alarm indicator on the distribution panel will be off.
6. Repeat steps 1 to 5 for all alarms.

8.18.3 External alarm test on RBS 2, 4 TRX and 6 TRX Configurations

1. Activate an alarm by applying appropriate closing or breaking depending on definition. The Alarm connectors are located in the interface box.
2. The external alarm indicator on RBS 1 will now be flashing and the external alarm indicator on the RBS that generates the fault will be lit.
3. Check with the OMT that the appropriate alarm appears.
4. Deactivate the alarm applied in step 1 so that no faults are indicated.
5. The external alarm indicator on RBS 1 will stop flashing and the external alarm indicator on the RBS that generated the fault will be off.
6. Repeat steps 1 to 5 for all alarms.

8.18.4 External alarm test on RBS 3, 4 TRX and 6 TRX Configurations

Follow the same test procedure as described for RBS 2 above.

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8.19 Battery Backup Test, RBS with Internal Battery

The purpose of this test is to verify that the battery is able to supply DC when the AC is off.

Note: Make sure that the Battery Fault indicator is not active before performing any battery test.

- This test is to be performed for each RBS.
- The test is passed if the RBS still is running when the incoming AC for the RBS has been switched off. (The Local Mode indicator is on, or flashing, when the RBS is running.)

Note: The battery backup time is about three minutes, depending on traffic, for instance.

8.19.1 Test Procedure

1. Make sure that the RBS has been powered up for at least 5 minutes before starting the test.

   After 24 hours the battery is fully charged.

2. Make sure that the battery power for the RBS is switched on, and the Battery Fault indicator is off. Low battery voltage makes the Battery Fault Indicator light up (yellow). If this is the case, recharge the battery.

3. Switch off the incoming AC for the RBS, and check that the indicator AC Power On is turned off.

   The test is passed if the RBS still is running. (When the RBS is running, the Local Mode indicator is on or flashing)

4. Switch on the incoming AC for the RBS. Check on the RBS that the AC Power On indicator lights up (yellow).

Table 36 Switch settings (RBS with internal battery)

Switch settings in the RBS		**Running conditions**
Power	**Batt**	
I	**I**	Before test
O	**I**	During test
I	**I**	After test

8.20 Battery Backup Test, RBS with External Battery (PBC)

The purpose is to test if the battery is able to supply DC when the AC is off.

Note: Make sure that the Battery Fault indicator is not active before performing any battery test.

- This test is to be performed for each set of RBS and PBC, which is included in the configuration used.

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- The test is passed if the RBS still is running when the incoming AC for the RBS and the PBC has been switched off. (The Local Mode indicator is on, or flashing, when the RBS is running.)

The battery backup time is approximately two hours.

8.20.1 Switch Settings, Before and After Test

Table 37 Switch settings, before and after test

Switch settings						Switch
PBC 1	RBS 1	PBC 2	RBS 2	PBC 3	RBS 3	
I	I	I	I	I	I	Power
I	I	I	I	I	I	Batt

8.20.2 Test Procedure, 2 TRX Sector Configuration

1. Make sure that the PBC has been powered up for at least 15 minutes before starting the test.

   After 24 hours the battery is fully charged.

2. Make sure that the AC and battery power for the RBS and the PBC is switched on, and the Battery Fault indicator is off on the RBS. Ensure that no faults are displayed on the PBC.

3. Switch off the incoming AC for the RBS and the PBC, and check on the RBS that the indicator AC Power On is off. The PBC alarm 020 is indicated.

Table 38 Switch settings during test, 2 TRX Sector configuration

Switch settings		Switch
PBC 1	RBS 1	
O	O	Power
I	I	Batt

4. Switch on the incoming AC for the PBC and the RBS. Check on the RBS that the AC Power On indicator lights up (yellow). The PBC alarm 020 disappears.

8.20.3 Test Procedure, 4 TRX and 6 TRX Configurations

1. Make sure that the PBC has been powered up for at least 15 minutes before starting the test.

   After 24 hours the battery is fully charged.

2. Make sure that the AC and battery power for the RBS and the PBC is switched on, and the Battery Fault indicator is off on the RBS. Ensure that no faults are displayed on the PBC.

3. Switch on the AC and battery power on all RBSs and PBCs.

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RBS 1, PBC 1

4. Switch off the incoming AC for RBS 1 and PBC 1. (Power switch settings according to *Table 39 on page 235*.)
5. Check on RBS 1 that the Battery Fault indicator is off. Alarm code 020 is displayed on PBC 1.
6. Switch on the incoming AC for RBS 1 and PBC 1. Check on RBS 1 that the AC Power On indicator lights up (yellow). The PBC 1 alarm 020 disappears.

Table 39 Switch settings during test of RBS 1, PBC 1

Switch settings						Switch
PBC 1	RBS 1	PBC 2	RBS 2	PBC 3	RBS 3	
O	O	I	I	I	I	Power
I	I	I	I	I	I	Batt

If 4 TRX or 6 TRX configuration is used continue with step 7 below.

RBS 2, PBC 2

7. Switch off the incoming AC for RBS 2 and PBC 2. (Power switch settings according to *Table 40 on page 235*.)
8. Check on the Master RBS (RBS 1) that the fault indicator, AC Power On, is not flashing. Flashing indicator means faulty battery for RBS 2, PBC 2. Alarm code 020 is displayed on PBC 2.
9. Switch on the incoming AC for RBS 2 and PBC 2, and check on RBS 1 and RBS 2 that the indicator AC Power On lights up (yellow). The PBC 2 alarm 020 disappears.

Table 40 Switch settings during test of RBS 2, PBC 2 (6 TRX configuration)

Switch settings						Switch
PBC 1	RBS 1	PBC 2	RBS 2	PBC 3	RBS 3	
I	I	O	O	I	I	Power
I	I	I	I	I	I	Batt

If 6 TRX configuration is used continue with step 10 below.

RBS 3, PBC 3

10. Switch off the incoming AC for RBS 3 and PBC 3. (Power switch settings according to *Table 41 on page 236*.)
11. Check on the Master RBS (RBS 1) that the fault indicator, AC Power On, is not flashing. Flashing indicator means faulty battery for RBS 3, PBC 3. Alarm code 020 is displayed on PBC 3.
12. Switch on the incoming AC for RBS 3 and PBC 3, and check on RBS 1 and RBS 3 that the indicator AC Power On lights up (yellow). The PBC 3 alarm 020 disappears.

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Table 41 Switch settings during test of RBS 3, PBC 3 (6 TRX configuration)

Switch settings						Switch
PBC 1	RBS 1	PBC 2	RBS 2	PBC 3	RBS 3	
I	I	I	I	O	O	Power
I	I	I	I	I	I	Batt

8.21 Concluding Routines

RBS with Internal Battery Backup

1. Save the IDB on a diskette. The name of the IDB file must be site specific. Label the diskette according to *Table 42 on page 237*.
2. Disconnect all test equipment.
3. Check that all cables are connected.
4. Make sure that no RBS faults are indicated.
5. Reset the RBS, if the RBS is not supposed to be in traffic or make sure that the RBS is in remote mode.
6. Close and lock the installation box door.
7. Close and lock the interface box cover on the RBS, and secure the interface box.
8. If 4 TRX or 6 TRX configuration is used:

   Repeat steps 3 to 7 for each RBS.
9. Check that all actions taken have been entered into a log-book, with data concerning time, date and name of the person who took the action(s).
10. Check that all tools and instruments have been removed from the site.

RBS with External Battery Backup (PBC)

1. Save the IDB on a diskette, the name of the IDB file must be site specific. Label the diskette according to *Table 42 on page 237*.
2. Disconnect all test equipment.
3. Check that all cables are connected.
4. Make sure that no RBS or PBC faults are indicated.
5. Reset the RBS, if the RBS is not supposed to be in traffic or make sure that the RBS is in remote mode, and that the PBC is operational.
6. Close and lock the installation box door.
7. Close and lock the interface box cover on the RBS and PBC, and secure the interface box.
8. If 4 TRX or 6 TRX configuration is used:

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Repeat steps 3 to 7 for each RBS and PBC.

9. Check that all actions taken have been entered into a log-book, with data concerning time, date and name of the person who took the action(s).

10. Check that all tools and instruments have been removed from the site.

Table 42 IDB diskette label

Item	Description
<Date>	Current date (YYMMDD)
<rev>	Revision state of the product
<Site Name>	Site name for the RBS
<RBS serial number>	Serial number of the RBS
<backup date>	Date of backup (YYMMDD)

8.22 Test Record

Example of test records that are to be filled in during the tests.

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8.22.1 Site Data

Site Hardware Status

Date.	Site Name:
Site No:	Cell configuration:
RBS type:	Testers Name:

Site Hardware Status

Unit	**Product No.**	**Serial No.**	**Rev.**	**Manufact. date**
RBS 1:				
-Radio cabinet				
-Mounting base				
-Battery/PSA				
-HDSL				
RBS 2:				
-Radio cabinet				
-Mounting base				
-Battery/PSA				
-HDSL				
RBS 3:				
-Radio cabinet				
-Mounting base				
-Battery/PSA				
-HDSL				
PBC 1				
-Battery cabinet				
-Mounting base				
PBC 2				
-Battery cabinet				
-Mounting base				
PBC 3				
-Battery cabinet				
-Mounting base				

P006057A

Figure 233 Site Hardware Status

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8.22.2 Test Result

Test Checklist

Test Record for Stand Alone Tests

NE Commissioning GSM -

Date.	Site Name:
Site No:	Cell configuration:
RBS type: 2302	Testers Name:

NE STAND ALONE TEST

		Remark
- AC Mains Power Test	☐	
- Start-up	☐	
- Self-test check	☐	
- Fan Unit Test	☐	
- Battery Backup Test	☐	
- Check IDB	☐	
- Define External Alarms	☐	
- Fault Status Reading	☐	
- External Alarm Test	☐	
- HDSL Configuration	☐	

TEI Value

	RBS 1	RBS 2	RBS 3	RBS 4	RBS 5
Multidrop					
Stand Alone					

PCM Parameters Settings
Short Haul (feet)/Long Haul (dB)

	RBS 1	RBS 2	RBS 3	RBS 4	RBS 5
LBO-A					

Notes: _____

P006056A

Figure 234 Test Record for Stand Alone Tests

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8.22.3 Trouble Report

A trouble report should be written when system components are not operating as expected, or when disturbances occur repeatedly. It should not be written for occasional hardware failures.

When writing a trouble report, always include as much information as possible, such as log files and IDB. Write the trouble report as soon as possible, preferably at the RBS site.

An example of a filled-in trouble report, and a trouble report form, are included in *chapter Fault Handling*.

The trouble report should be sent to the nearest FSC (Field Support Centre) for resolution and registration in the Ericsson trouble report system MHS (Modification Handling System). The FSC should forward the trouble report via the node MHO ERA BTS.

8.22.4 Repair Delivery Note ‘‘Blue Tag’’

When a faulty unit is returned, it must always be accompanied by a repair delivery note. When the repair delivery note has been completed it must be attached to the faulty unit before sending it for repair.

The repair delivery note LZF 084 84 can be ordered from the local FSC. A repair delivery note is presented in *chapter Maintenance*.

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9 Optional Tests

9.1 Preconditions

These tests are already performed in the factory and are therefore optional.

9.1.1 Previous Tests

Before performing any optional test make sure all tests in *chapter Site Installation Tests* have been performed successfully.

9.1.2 Tester qualifications

This instruction is intended for testers with experience of the simulator. The tester should also have knowledge of the different types of base stations in the RBS 2000 family, and be familiar with the different cell and link configurations that the base stations might have.

9.1.3 Electrostatic Discharge

Always use an approved antistatic bracelet to avoid damage to components mounted on printed board assemblies.

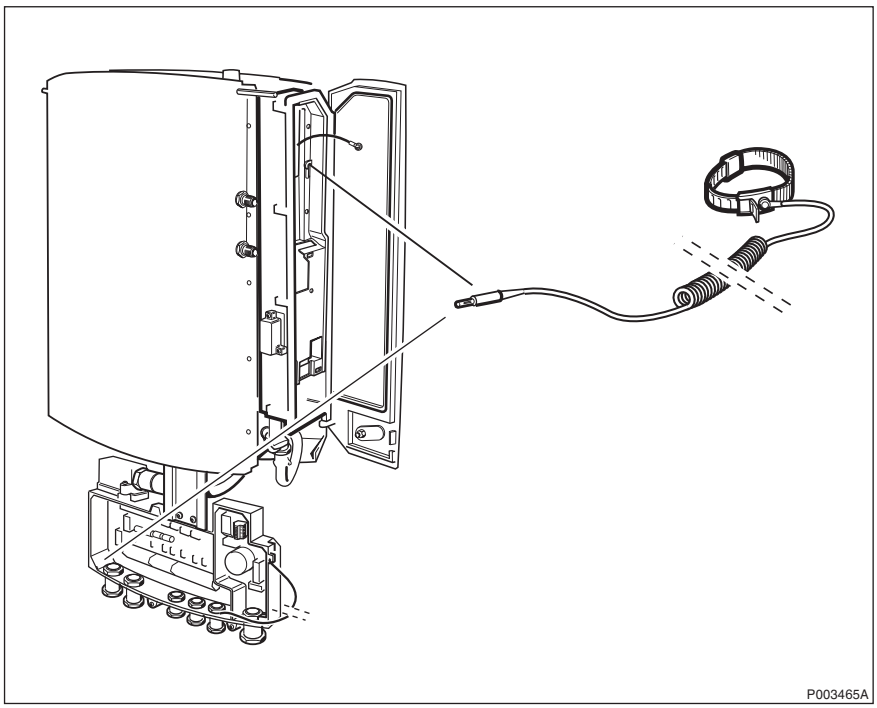

Figure 235 Connecting the ESD wrist strap to the RBS

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9.2 MS Call Test using BSC Simulator

This test is to be performed when no PCM-line from the BSC is available.

CAUTION

Radio frequency (RF) radiation from antenna systems can endanger your health.

The purpose of this test is to ensure that it is possible to make calls on the base station. The test is passed when a call has been made on all the TRXs.

The equipment used is BSCSim II, a mobile station (MS) and a multicasting box (MCB).

For more information regarding the BSCSim II, refer to:

BSCSim II User's Guide *EN/LZT 123 2771/1*

For tests involving the HDSL modem, also the MartisDXX HTU-2M (product number ZAT 759 20/101) is needed. This instrument will throughout the instructions be referred to as HTU.

Note: The HTU is not needed for tests on PCM upstream–HDSL downstream configuration.

The HTU is used as an converter between the PCM signal and the HDSL signal.

9.2.1 Test Parameters

Before performing any test, the appropriate parameters must be considered when configuring the BSCSim II.

The following parameters should be considered:

- System type
- Network frequency
- RBS type
- Transmission type
- BTS Software
- Positioning of TRXs
- Cell
- LAC
- Diversity

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- ARFCN
- Power

9.2.2 Cables

Throughout the instructions the cables will be referred to as follows:

C1	OMT cable
C2	MS cable
C3	Transmision cable, E1 Ω
C4	Transmision cable, T1 100 Ω, E1 120 Ω
C5	Transmision cable, HDSL
C6	Cable between BSCSim and HTU
A1	Attenuator, 30 dB, 2 W
Ad1	Adapter

See *chapter Tools and Instruments* for more information.

9.2.3 Test using the MS and BSC Simulator

Note: If HDSL modem is used perform the setup and the test according to *Section 9.2.4 Test through HDSL using the MS and BSC Simulator on page 246*.

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Test Setup Procedure: 2 TRX Configuration

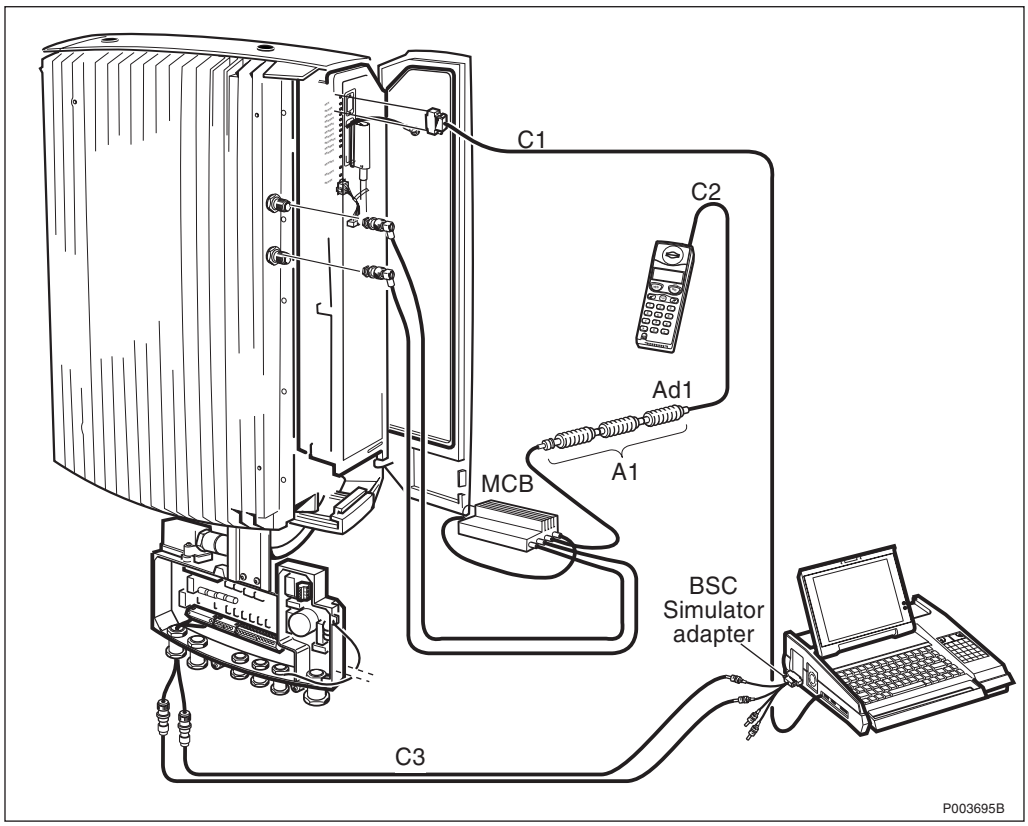

Figure 236 Setup using BSC simulator, E1 75 Ω (2.0 Mbit/s)

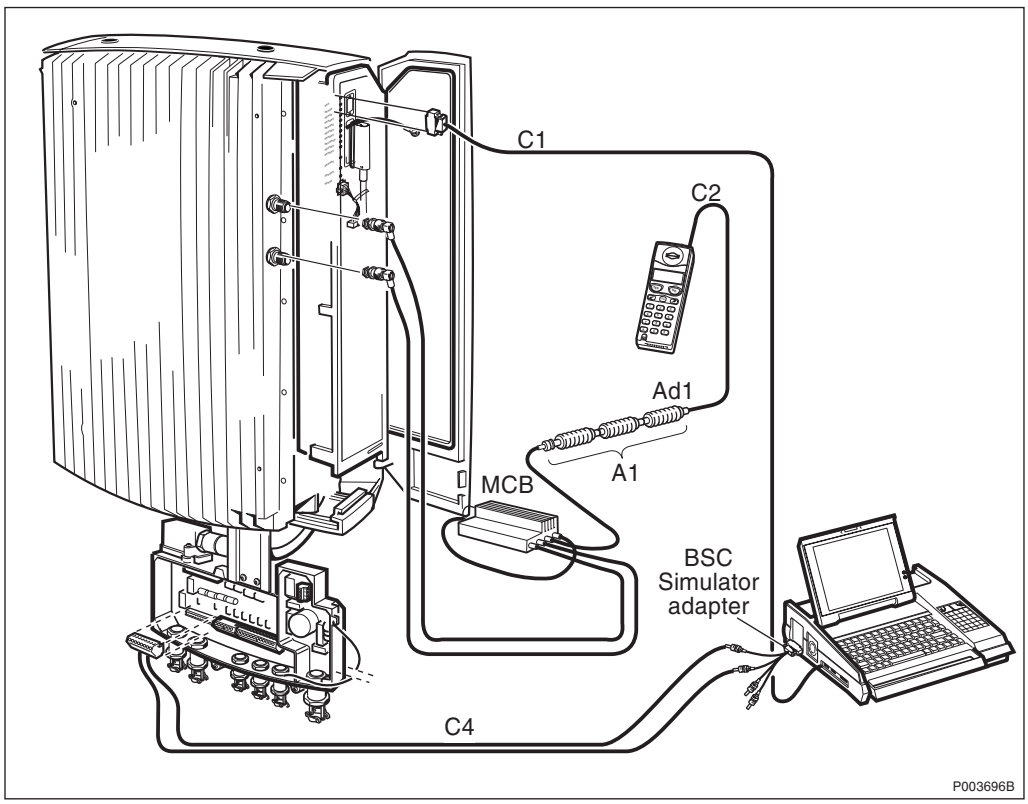

Figure 237 Setup using BSC simulator, T1 100 Ω (1.5 Mbit/s) and E1 120 Ω (2.0 Mbit/s)

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1. Ensure that the RBS is in Remote mode. If not, change to Remote mode by pressing the Local remote button on the RBS.
2. Connect cable C1 to the COM1 port on the BSC simulator, and to the input inside the installation box marked OMT.

Note: Always connect the BSC simulator to the Master RBS (BSCSim II, R2A or later, is required).

3. Connect the BSC Simulator adapter to the input on the BSC simulator.
4. Connect the cables between the BSC simulator and the interface box:

   For E1 75 Ω:

   1. Disconnect the existing cables from the PCM A cables that are connected to the interface box.
   2. Connect the cables C3 to the BNC connector on the BSC Simulator adapter.
   3. Connect the cables C3 to the PCM A cables that are connected to the interface box, *see Figure 236 on page 244*.

   For T1 100 Ω and E1 120 Ω:

   1. Remove the existing PCM A cables plug from the interface box.
   2. Connect the BNO connector on cable C4 to the BNO connector on the BSC Simulator adapter.
   3. Connect the C4 cables plug to the PCM A socket in the interface box, *see Figure 237 on page 244*.

5. Connect cable C2 to the antenna inlet on the mobile, and to the adapter Ad1.
6. Connect the adapter Ad1 to the first attenuator A1.
7. Connect the three attenuators A1 together.
8. Connect the third attenuator A1 to the Multicasting Box (MCB).
9. Make sure that the RBS are switched off or is not transmitting. Disconnect the antenna jumper cables from the antenna outputs X2 and X3 on the RBS.
10. Connect the cables from the MCB to the antenna outputs on the RBS:

    TX/RX Ant A to X2

    TX/RX Ant B to X3

11. Switch on the PBC (if used), RBS and the BSC simulator

Test Setup Procedure: 4 TRX and 6 TRX Configurations

When this test setup is used, one cell per RBS must be defined.

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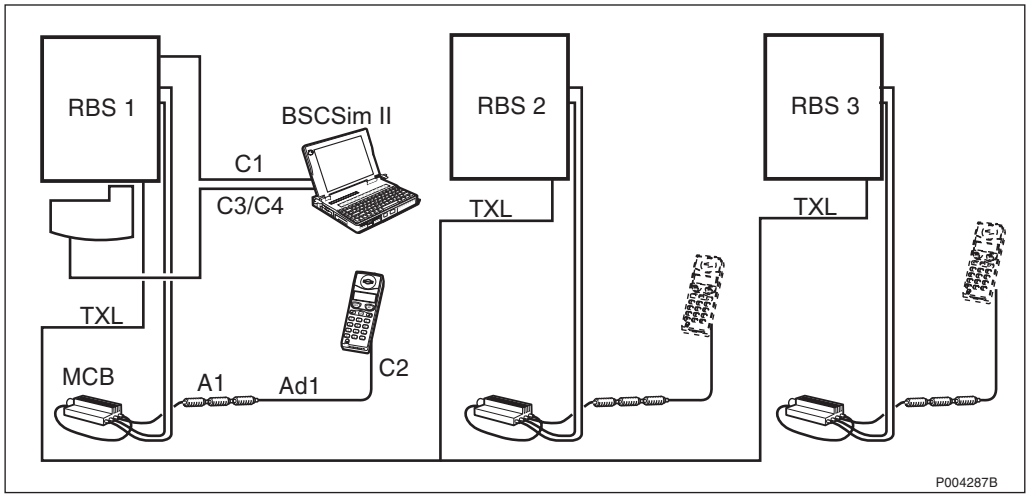

Figure 238 Test setup for 4 TRX and 6 TRX configurations

1. Master RBS: Follow the instructions in *Section Test Setup Procedure: 2 TRX Configuration on page 244.*
2. Extension RBSs: Assemble cable C2, adapter Ad1, attenuator A1 and MCB, and connect the assembly to each Extension RBS.
3. When making a call test, connect the mobile station to the RBS that is to be tested.

Test Sequence

Note: The time from start until the RBS is operational varies depending on the ambient temperature. For example, it may take up to 15 minutes at (minus) -15 °C, and up to 30 minutes at (minus) -33 °C.

1. Start the RBS with diversity A.
2. Make a call test.
3. Reconfigure the RBS to diversity B.
4. Make a call test.

The test is passed when the following conditions are fulfilled:

- RXqual = 0.
- The tester is satisfied with the speech quality.
- The RX values do not differ more than 4 dB between TRXs, when comparing uplink and downlink respectively (provided that the test setup is the same).

When the test is completed, disconnect the test equipment and reconnect the cables to the PCM A socket in the interface box.

9.2.4 Test through HDSL using the MS and BSC Simulator

Note: If a HDSL modem is not used perform the setup and the test according to *Section 9.2.3 Test using the MS and BSC Simulator on page 243.*

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Test Setup Procedure

The followning figures show examples of different test setups.

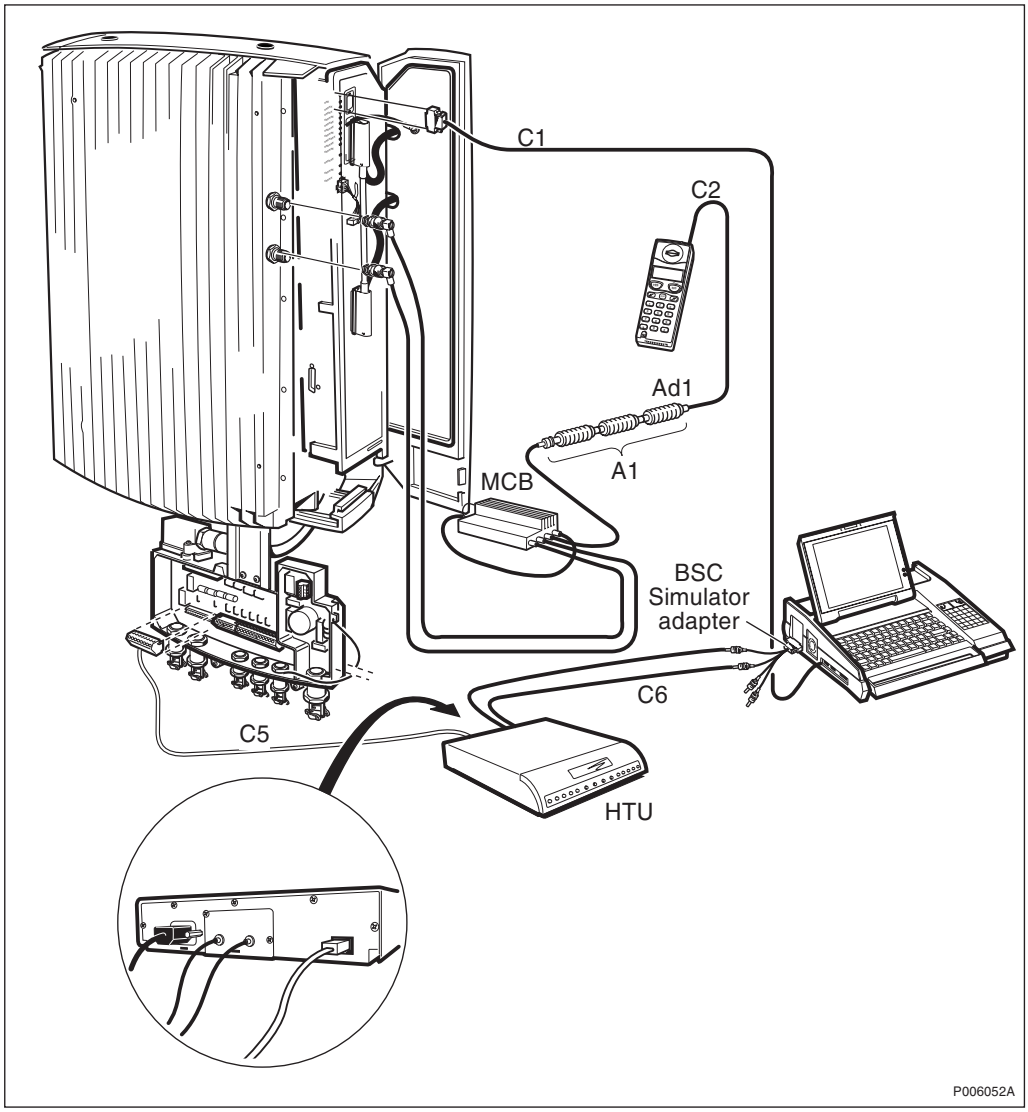

Figure 239 Example of test setup, HDSL upstream, one or two pairs

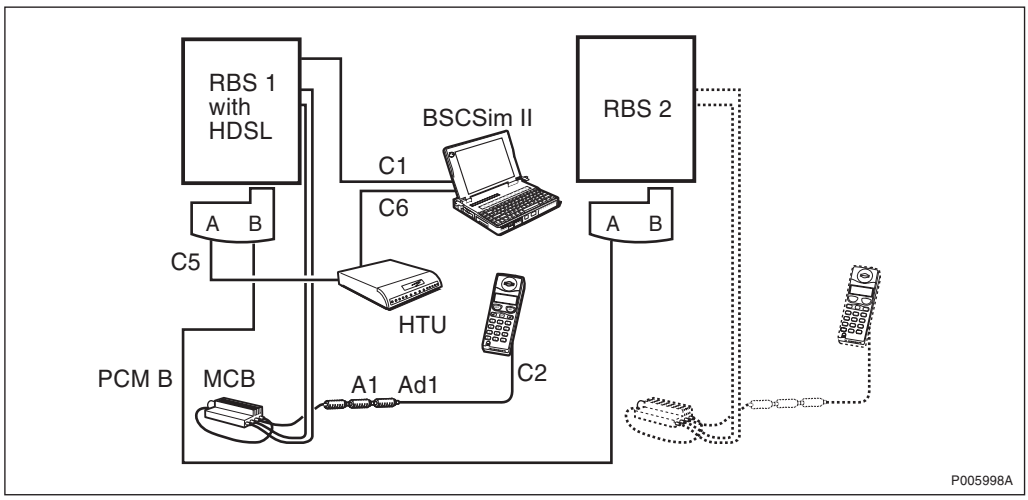

Figure 240 Example of test setup, HDSL upstream, one or two pairs–PCM downstream

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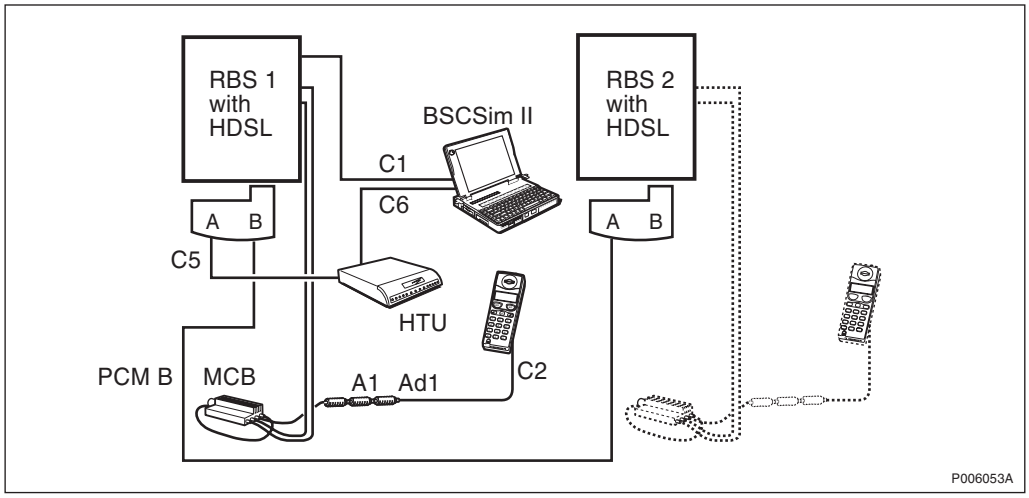

Figure 241 Example of test setup, HDSL upstream–HDSL downstream (cascade)

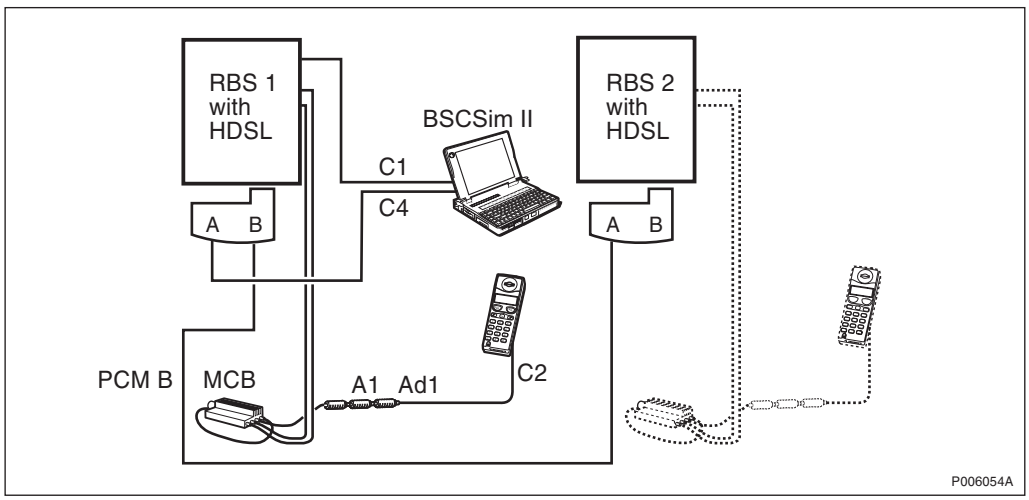

Figure 242 Example of test setup, PCM upstream–HDSL downstream, one or two pairs

For detailed information on how to connect the cables for the different configurations, *see chapter Installation of RBS 2302*

Follow the procedure below to setup the test equipment.

Note: The HTU is not needed for tests on PCM upstream–HDSL downstream configuration.

If the HTU is not used, perform the setup and the test according to *Section Test Setup Procedure: 2 TRX Configuration on page 244*.

1. Ensure that the RBS is in Remote mode. If not, change to Remote mode by pressing the Local remote button on the RBS.
2. Connect cable C1 to the COM1 port on the BSC simulator, and to the input inside the installation box marked OMT.

Note: Always connect the BSC simulator to the Master RBS (BSCSim II, R2A or later, is required).

3. Connect the BSC simulator adapter to the input on the BSC simulator.

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4. Connect the cables between the BCS simulator via the HTU to the interface box (E1 120 Ω):

    1. Remove the existing PCM A cables plug from the interface box.
    2. Connect the coaxial cable C6 to the BNC connectors on the BSC simulator adapter.
    3. Connect the coaxial cable C6 from the BSC simulator to the SMB connectors on the HTU.
    4. Connect the cable C5 to the RJ45 socket on the HTU and connect the cables plug to the PCM A socket in the interface box.

5. Connect cable C2 to the antenna inlet on the mobile, and to the adapter Ad1.
6. Connect the adapter Ad1 to the first attenuator A1.
7. Connect the three attenuators A1 together.
8. Connect the third attenuator A1 to the Multicasting Box (MCB).
9. Make sure that the RBS are switched off or is not transmitting. Disconnect the antenna jumper cables from the antenna outputs X2 and X3 on the RBS.
10. Connect the cables from the MCB to the antenna outputs on the RBS:

    TX/RX Ant A to X2

    TX/RX Ant B to X3

11. Switch on the PBC (if used), RBS, HTU (if used) and the BSC simulator

Test Sequence

1. Make sure that the connectors and the DIP switches are set correctly, according to *chapter Site Installation Tests*.
2. Set HTU parameters:

    To confirm a selection, press Enter on the HTU.

    1. Select HTU-2M.
    2. Select Params.
    3. Select HDSLine.
    4. Select HDSLTyp and OTU.
    5. Select LineMod and choose 1×2M (one pair) or 2×1M (two pairs), depending on the configuration *see Table 43 on page 250*.
    6. Select Role and choose Master (when using the HTU, the HTU is always defined as Master and the HDSL modem as Slave).
    7. Select NWTopol and choose P_to_P or Chain depending on the configuration *see Table 43 on page 250*.

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8. Select Update and choose Update. The display shows "UPDATING".
9. Go back to the main menu by pressing Exit three times.

3. Check on the HDSL modem that the LEDs are indicating the correct configuration, *see Section HDSL Modem LEDs on page 250*.
4. Check on the HTU that LineCnd on the display shows “OK” (for one pair) or “OK/OK” (for two pairs). If not, check the connections and make sure that the correct configuration is used.
5. Make call tests (diversity A and B) using the BSC simulator.

   The test is passed when calls have been made on all TRXs. At least one timeslot must be tested in each TRX.
6. When the test is completed, disconnect the test equipment and reconnect the cables to the PCM A socket in the interface box.

Table 43 Parameter settings in the HTU

	Parameters in HTU			
Configurations	**HDSLTyp**[1)]	**LineMod**	**Role**	**NWTopol**
HDSL upstream, one pair	OTU	1×2	Master	P_to_P
HDSL upstream, two pairs	OTU	2×1	Master	P_to_P
HDSL upstream, one pair-PCM downstream	OTU	1×2	Master	P_to_P
HDSL upstream, two pairs-PCM downstream	OTU	2×1	Master	P_to_P
HDSL upstream-HDSL downstream (cascade)	OTU	1×2	Master	Chain
PCM upstream-HDSL downstream, one pair	OTU	1×2	Master	P_to_P
PCM upstream-HDSL downstream, two pairs	OTU	2×1	Master	P_to_P

[1)]ETSI when choosed.

HDSL Modem LEDs

Table 44 HDSL modem LEDs indicating the current configuration

Configuration	**HDSL modem LEDs**
HDSL upstream, one pair	On, On, Off
HDSL upstream, two pairs	On, On, On
HDSL upstream, one pair-PCM downstream	On, On, Off
HDSL upstream, two pairs-PCM downstream	On, On, On

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HDSL upstream-HDSL downstream (cascade)	On, On, On
PCM upstream-HDSL downstream, one pair	On, Off, On
PCM upstream-HDSL downstream, two pairs	On, On, On

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9.2.5 Test Record

Test Record for Optional Tests

NE Commissioning GSM -

Date.	Site Name:
Site No:	Cell configuration:
RBS type:	Testers Name:

MS CALL TEST

			RX A				RX B			
			RX Level		RX Quality		RX Level		RX Quality	
TRX	TS	TA	DL	UL	DL	UL	DL	UL	DL	UL
1										
2										
3										
4										
5										
6										

HDSL Configuration: _____ ☐ Leds OK.
(if used)

Remarks: _____

_____

_____

_____

P006055A

Figure 243 Test Record for Optional Tests

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10 RBS Site Integration

This test instruction describes the procedure for loading and test of the Base Transceiver Station (BTS) of RBS 2000 series type.

10.1 Introduction

This chapter contains information about how to integrate a RBS site into the Network and make it work.

10.1.1 Overview

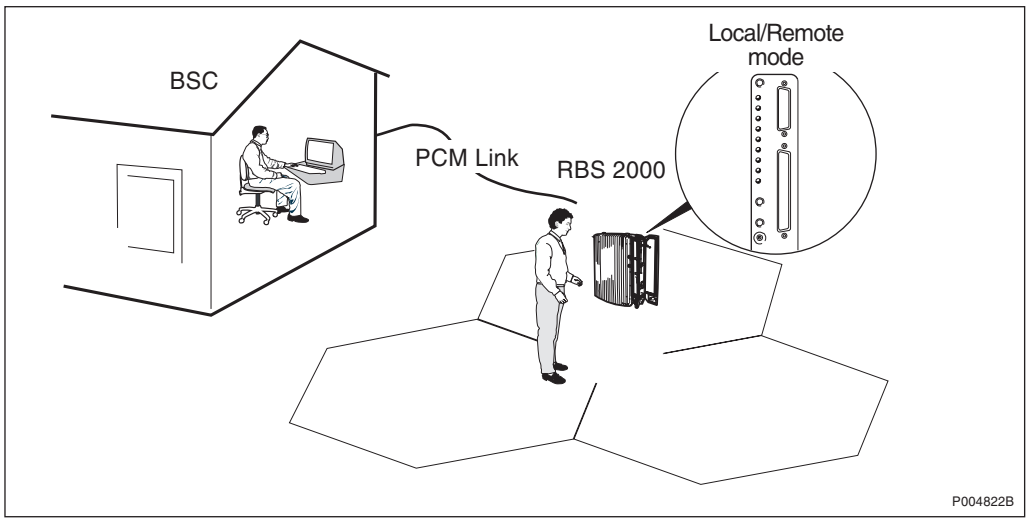

Figure 244 Integrating the BTS into the Network which is operated by the BSC

The integration of the RBS is performed with the RBS connected to the BSC and in close cooperation with the BSC personnel. The Man Machine Language (MML) commands within this chapter are performed from the BSC.

Throughout the instruction, the site specific parameters are referred to as x and y:

x	Transceiver group number
y	Transceiver number

All test results for the RBS should be documented in the Test Record by the RBS commission staff.

10.1.2 Range of Test

The RBS commissioning staff will switch the RBS from local to remote mode. Communication will then be established between BSC and RBS. The following managed objects are brought into service and deblocked by command from the BSC:

- TG - Transceiver Group
- CF - Central Functions
- IS - Interface Switch
- DP - Digital Path
- CON - LAPD Concentrator

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- TF - Timing Function
- TRX - Transceiver
- TX - Transmitter
- RX - Receiver
- TS - Time Slot

During deblocking, the following actions are performed for every MO:

- Clearing any indication of faults.
- Performing a reset on the RBS Managed Object.
- Ensuring that the Managed Object instance in question has the correct software loaded. If this is not the case, the correct version will be loaded.
- Updating the equipment with it's required operational data.

In addition to actions detailed above, a loop test will be performed for managed objects of class TS. This will verify that the managed object is capable of carrying traffic.

The cell is activated, e.g. radio equipment will be enabled. When the cell is active and configured, call tests will be made over the air interface. Tests will be performed on RXA and RXB separately if a tests with the BSC simulator has not already been performed. For information about tests with the BSC simulator, *see chapter Optional Tests.*

The external alarms will be tested by simulating alarms in the RBS and check that the correct alarm string is received in the BSC.

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10.1.3 Flowchart

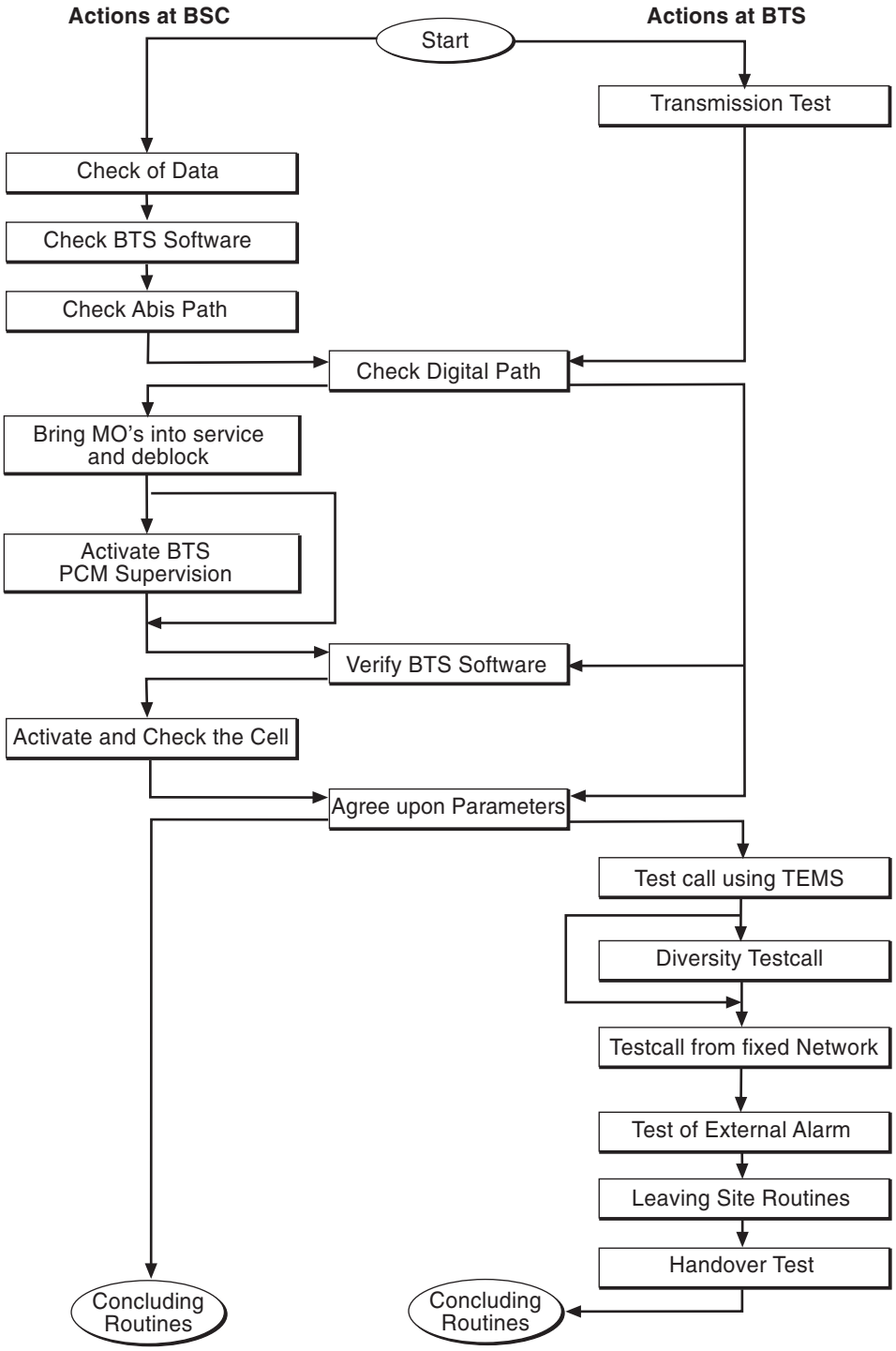

Figure 245 Flowchart that describes the BSC and BTS actions and the interactions between them

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10.2 Preconditions

The preconditions are listed separately for the BSC and for the RBS on Site. The work can only begin when both those lists of preconditions have been fulfilled.

10.2.1 Preconditions for the BSC

- The NE (network element) tests for the BSC must have been performed.
- The integration test of MSC/VLR must have been performed, e.g. it must be possible to make calls.
- Exchange data for definition of Managed Objects, Cells and Abis paths must be loaded. For further information, *see Helpful Hints Section 10.10 on page 276.*
- The transmission to the RBS site must be working before performing the call tests.
- The correct RBS software must have been loaded into the IOG.

10.2.2 Preconditions for the RBS

- If Transport Modules (TM) are used, they must be loaded with the correct data.
- Make sure that the RBS is in remote mode.
- The RBS commissioning staff must have contact with the BSC staff.

10.3 Transmission Test

The purpose of this test is to ensure that the connection between RBS and BSC is working correctly.

10.3.1 Transmission Test E1

Note:

- This test does not include the transmission through the Mounting Base.
- The test is performed only when the RBS is directly connected to the BSC.
- The test is not performed if a transmission network is used.

1. Remove the PCM A cable plug from the transmission filter, located in the interface box.
2. Connect the PCM A cable plug to the loopback socket on the connector board CB21, *see Figure 246 on page 257*.

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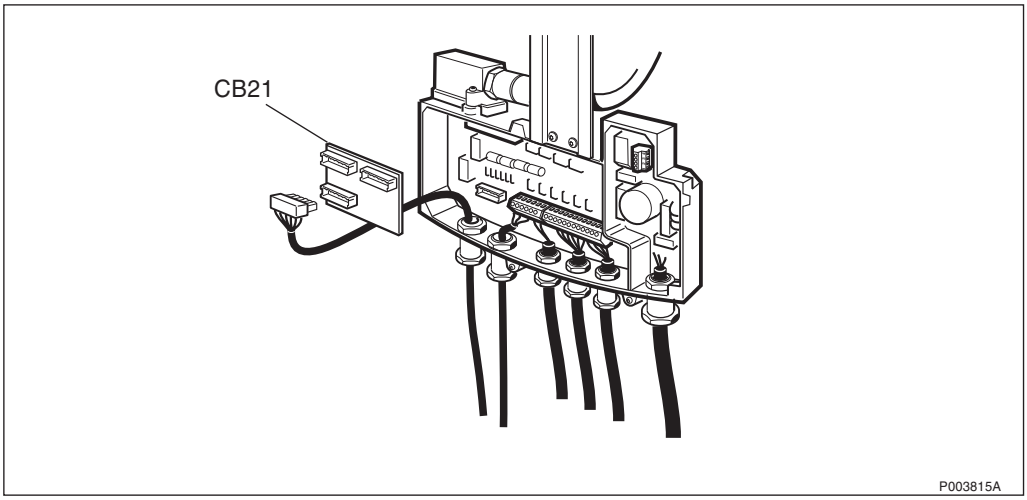

Figure 246 CB21 connector board

3. Request the BSC operator to check the digital path on the active RBLT. An appropriate command for this procedure is: <DTSTP:DIP=RBLT-XXX;

10.3.2 Transmission Test T1

A transmission test can be performed in two ways:

A. Perform the test according to *Section 10.3.1 on page 256.*

B. Request the BSC operator to use CSU functionality. The parameter is set (and cleared) with the OMT. The function is initiated during restart of the CMRU. For further information, refer to:

Reference Manual *LZN 302 77*

10.3.3 Transmission Test E1 with HDSL

1. Check that the green LED indicator on the HDSL modem lights steadily.
2. Wait for the yellow LED indicators to change from flashing to steady light.

   The number of indicators engaged vary, depending on the configuration used.

For further information regarding the HDSL optical indicators, refer to *chapter Site Installation Tests*.

10.4 Preparations

10.4.1 Check of Data

Check with these commands that the correct data is loaded in the BSC and if not, load it. For further information about the DT-files, *see Helpful Hints Section 10.10 on page 276.*

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Note: Only the most important data is listed.

1. Check definition for MO's.

Command:	**RXMOP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOCF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOCON-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXODP-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOIS-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOTF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOTRX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOTX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA
Command:	**RXMOP:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA

2. Check that BTS PCM Supervision DIP is defined.

Command:	**DTDIP :DIP=modip;**
Printout:	DIGITAL PATH

3. Check definitions for cell data.

Command:	**RLLBP;**
Printout:	LOCATING BSC DATA
Command:	**RLDEP:CELL=cell;**
Printout:	CELL DESCRIPTION DATA

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Note: Make a note of the parameter BCCHNO's value and of the parameter BSIC's value, it will be needed during the Call Test.

Command:	**RLCFP:CELL=cell;**
Printout:	CELL CONFIGURATION FREQUENCY DATA

Note: Make a note of the parameter DCHNO's different values, it will be needed during the Call Test.

Command:	**RLCPP:CELL=cell;**
Printout:	CELL CONFIGURATION POWER DATA
Command:	**RLLOP :CELL=cell;**
Printout:	CELL LOCATING DATA
Command:	**RLLUP:CELL=cell;**
Printout:	CELL LOCATING URGENCY DATA
Command:	**RLLDP :CELL=cell;**
Printout:	CELL LOCATING DISCONNECT DATA
Command:	**RLLPP:CELL=cell;**
Printout:	CELL LOCATING PENALTY DATA
Command:	**RLMFP:CELL=cell;**
Printout:	CELL MEASUREMENT FREQUENCIES
Command:	**RLNRP :CELL=cell,CELLR=ALL;**
Printout:	NEIGHBOUR RELATION DATA

10.4.2 Check the BTS Software

1. Verify that the correct BTS software version is stored on the harddisc in the IOG11. It is one file with a number of subfiles which should be named "btsfilename-HEADER ". Check if it is defined and the SW is loaded.

   Example: For a RBS 2000 BTS SW in the CME 20 R6, the "btsfilename" should be B4311Rxxxx.

Command:	**INMCT :SPG=0;**
Printout:	:
Command:	**INFIP:FILE=btsfilename;**
Printout:	FILE ATTRIBUTES
Command:	**END;**
Printout:	:

2. Verify that the existing BTS software is defined for the TG.

Command:	**RXMOP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA

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3. If the wrong software version is in use, activate the desired BTS software version.

Command:	**RXMSC:MO=RXOTG-x, SWVER=correct_btssoftware;**
Expected Result:	EXECUTED
Command:	**RXMSC:MO=RXOCF-x, SWVER=DEFAULT;**
Expected Result:	EXECUTED
Command:	**RXMSC:MO=RXOTRX-x-y&&-z, SWVER=DEFAULT;**
Expected Result:	EXECUTED

4. Verify that the new BTS software is defined for the TG.

Command:	**RXMOP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA

10.4.3 Check the Abis Paths

Check that the Abis paths are correctly defined, for example that the RBLT-devices are tied to the correct position in the IS. For further information, *see Helpful Hints Section 10.10 on page 276.*

Command:	**RXAPP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION ABIS PATH STATUS

10.4.4 Check the Digital Path

Check that the Digital Path used towards the BTS site is working.

Command:	**DTSTP:DIP=RBLTx;**
Printout:	DIGITAL PATH STATE

10.5 Connecting the RBS from the BSC

10.5.1 Bring MO's into Service and Deblock

The DT-file 97xxx could be used for this. There are two ways for the BSC personnel to perform this step.

- **Case 1:** The BSC personnel works "online" with the RBS. That is if the transmission is working properly and that the RBS is set in Remote mode. The RBS engineer should be present on site, but that is not necessary, since this activity is performed from the BSC.
- **Case 2:** The other way is to prepare the RBS in Local mode. The MO's will then logically be taken into service and deblocked. The

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RBS engineer then sets the RBS into remote mode which will automatically configure the RBS.

During this procedure you can use the command "RXMSP:MO=mo...;" to check the current state of the MO. For information about the MO's different states, *see Helpful Hints Section 10.10 on page 276.*

1. Bring the managed object TG into service.

Command:	**RXESI:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

2. Bring the managed object CF into service.

Command:	**RXESI:MO=RXOCF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

3. Bring the managed object TF into service.

Command:	**RXESI:MO=RXOTF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

4. Bring the managed object IS into service.

Command:	**RXESI:MO=RXOIS-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

5. Bring the managed object CON into service.

Note: This MO is optional and should only be brought into service if it is included in the DT.

Command:	**RXESI:MO=RXOCON-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

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6. Bring the managed object DP into service.

Note: This MO is optional and should only be brought into service if it is included in the DT.

Command:	**RXESI:MO=RXODP-x-a;** (a="0" or "1")
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

7. Deblock the managed object TG.

Command:	**RXBLE:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

8. Deblock the managed object CF.

Command:	**RXBLE:MO=RXOCF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

9. Deblock the managed object TF.

Command:	**RXBLE:MO=RXOTF-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

10. Deblock the managed object IS.

Command:	**RXBLE:MO=RXOIS-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

11. Deblock the managed object CON.

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Command:	**RXBLE:MO=RXOCON-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

12. Deblock the managed object DP.

Command:	**RXBLE:MO=RXODP-x-a;** (a="0" or "1")
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

13. Bring the managed objects TRX into service.

Command:	**RXESI:MO=RXOTRX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	MO NOT LOADABLE FROM THE BSC
Expected result (case 2):	NOT LOADED

14. Bring the managed objects TX into service.

Command:	**RXESI:MO=RXOTX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

15. Bring the managed objects RX into service.

Command:	**RXESI:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

16. Bring the managed objects TS 0 to TS 7 into service.

Command:	**RXESI:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result (case 1):	LOADED
Expected result (case 2):	NOT LOADED

17. Repeat step 13 on page 263 to step 16 on page 263 for each TRX's.

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18. Deblock the managed object TRX.

Command:	**RXBLE:MO=RXOTRX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

19. Deblock the managed object TX.

Command:	**RXBLE:MO=RXOTX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

20. Deblock the managed object RX.

Command:	**RXBLE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

21. Deblock the managed object TS.

Command:	**RXBLE:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result (case 1):	EXECUTED
Expected result (case 2):	EXECUTED

22. Repeat step 18 on page 264 to step 21 on page 264 for each TRX's.

10.5.2 Activation of BTS PCM Supervision (Optional)

This should only be done if BTS PCM Supervision is used. That is if the Managed Object DP is defined, taken into service and deblocked.

1. Deblock the BTS PCM Supervision DIP.

Command:	**DTBLE :DIP=modip;**
Expected result:	EXECUTED

2. Check DIP state, the DIP should be working.

Command:	**DTSTP:DIP=modip;**
Printout:	DIGITAL PATH STATE

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3. Check that the MO DP state is operational (OPER).

Command:	**RXMSP:MO=RXODP-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT STATUS

10.5.3 Verification of Downloaded RBS Software

This verification should be done both from the BSC and from the RBS.

1. Verify the software version from the RBS, use the OMT and its function “Display Software Versions”. Make a note of the versions in the testrecord.
2. Verify the software version from the BSC.

Command:	**RXMOP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT DATA

3. Compare that the software versions in the BSC and the BTS are the same. If they are not the same, information about unconditional download of software can be found in: *see Helpful Hints Section 10.10 on page 276.*

10.5.4 Activation and Check of Cell

1. Activate the cell.

Command:	**RLSTC:CELL=cell,STATE=ACTIVE;**
Printout:	CELL STATE CHANGE RESULT

2. Check that the Digital Path used towards the BTS site is working.

Command:	**DTSTP:DIP=RBLTx;**
Printout:	DIGITAL PATH STATE

3. Verify that logical channels are configured.

Command:	**RLCRP :CELL=cell;**
Printout:	CELL RESOURCES

4. Check that all equipment has been correctly configured.

Command:	**RXCDP :MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION CONFIGURATION DATA

5. Make a note of which timeslots are used for the SDCCH. This information will be needed during the call tests.

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10.5.5 Agree upon Parameters

The BSC staff must inform the RBS staff about the value of the following parameters:

BCCHNO	Absolute Radio Frequency (RF) channel number for Broadcast Control Channel (BCCH)
DCHNO	Absolute RF Channel Number
BSIC	Base Station Identity Code
SDCCH	Stand Alone Dedicated Control Channel

These parameters will be used for call tests with TEMS.

10.6 Call Tests on Air Interface

The tests are performed from the BTS site and are intended to verify that calls can be made on all TRX's in all cells. Two call tests must be made in each cell, one to the mobile station and one from the mobile station. The call tests should be performed with a TEMS mobile and using the TEMS program (PC software).

Note: The Diversity call tests should only be performed if Antenna Diversity is supported and if The Stand Alone Test has not been performed.

The call tests should be performed at a distance of at least 50 meter from the RBS and with the door closed.

10.6.1 Call Tests using TEMS

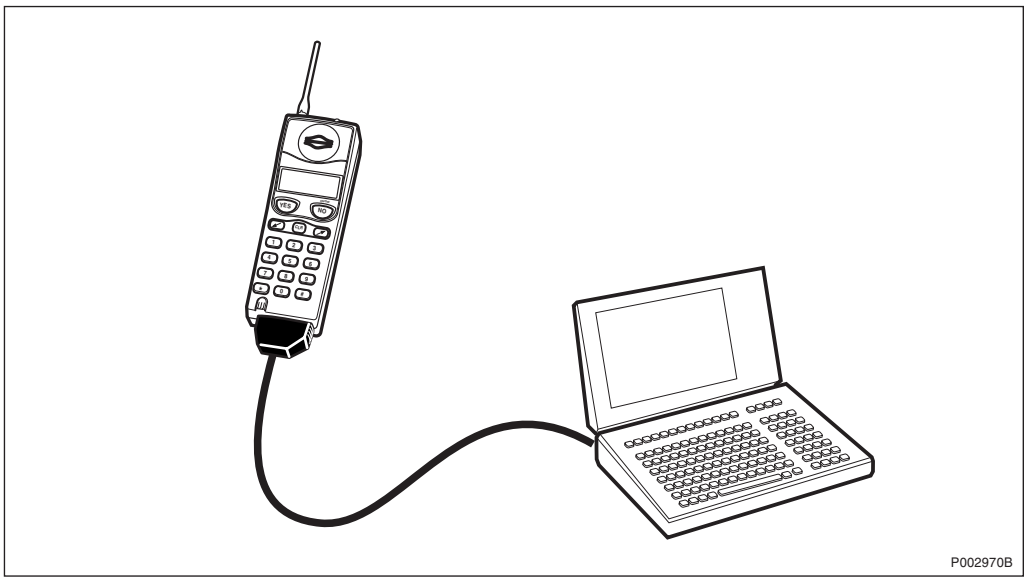

Figure 247 Connecting a PC to mobile

1. Connect the TEMS with a TEMS cable to a PC containing the TEMS program. Connect the cable to COM1.

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2. Start the TEMS program and establish a connection between the MS and the PC. Choose “Enable connections” from the Externals menu.

TEMS Manual

3. In the PC, define the COM1 for the MS 1 port. The other two ports should be set to “Not used”.
4. Start the function “Test of TCH” under Control.
5. Fill in the telephone number you use for the test, the Frequency number (ARCFN) for the Broadcast channel (BCCH) for the cell and the Frequency number for the Traffic channel (TCH). Note that for the first TRX in every cell the BCCH number is the same as the TCH number.
6. Fill in the boxes for the timeslots (TS). All the TS used for traffic should be tested. With that means every TS in every TRX except for the first TRX. In the first TRX there are two TS’s that are used for the BCCH (timeslot 0) and the SDCCH (timeslot determined by the BSC staff), and which can therefore not be tested.

   Choose Add and repeat for all TRX’s.
7. Choose start. The TEMS will now perform calls on all preset timeslots. The BTS commissioning staff will verify speech quality of each call and mark it Pass or Fail.
8.

The test is finished when all timeslots are passed. Note the results in the test record.

10.6.2 Diversity Call Test

This test do not need to be performed if the Stand Alone Test using the BSC Simulator has been done or if antenna diversity is not supported.

Configure RXD=A

1. If necessary, disable frequency hopping.

Command:	**RLCHC:CELL=cell, HOP=OFF;**
Printout:	EXECUTED

2. Make sure that the antenna system is connected.
3. Block all TS’s and RX’s in the TG and take the RX’s out of service.

Command:	**RXBLI:MO=RXOTS-x-y-0&&-7, FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

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Repeat for all TRX's.

Command:	**RXBLI:MO=RXORX-x-y, FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

Command:	**RXESE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT OUT OF SERVICE RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

4. Configure diversity parameter to RXD=A for all RX's in the TG.

Command:	**RXMOC:MO=RXORX-x-y, RXD=A;**
Expected result:	EXECUTED

Repeat for all TRX's.

5. Bring all RX's in the TG into service and deblock the RX's and the TS's.

Command:	**RXESI:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected result:	LOADED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

6. Check that the cell is configured with logical channels.

Command:	**RLCRP :CELL=cell;**
Printout:	CELL RESOURCES

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Call test from MS on RXD=A

1. Block all TRX's except for one.

Command:	**RXBLI:MO=RXOTRX-x-y,FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJEKT RESULT

2. Check that one TRX is configured with BCCH and SDCCH.

Command:	**RXCDP :MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION CONFIGURATION DATA

3. Make a call from the MS.
4. Check that one TCH is BUSY. Verify the speech connection.

Command:	**RLCRP :CELL=cell**
Printout:	CELL RESOURCES

5. Terminate the call.

Command:	**RLCRP :CELL=cell**
Printout:	CELL RESOURCES

   Check that the TCH is released.

6. Deblock the blocked TRX's.

Command:	**RXBLE:MO=RXOTRX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT

7. Repeat step 1 on page 269 to step 6 on page 269 until all TRX's in the cell are tested. Note the results in the Test Record.

Configure RXD=B

1. Block all TS's and RX's in the TG and take the RX's out of service.

Command:	**RXBLI:MO=RXOTS-x-y-0&&-7, FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJEKT RESULT
Expected Result:	EXECUTED

   Repeat for all TRX's.

Command:	**RXBLI:MO=RXORX-x-y,FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJECT RESULT
Expected Result:	EXECUTED

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Repeat for all TRX's.

Command:	**RXESE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT OUT OF SERVICE RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

2. Configure diversity parameter to RXD=B for all RX's in the TG.

Command:	**RXMOC:MO=RXORX-x-y, RXD=B;**
Expected Result:	EXECUTED

3. Bring all RX's in the TG into service and deblock the RX's and the TS's.

Command:	**RXESI:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected Result:	LOADED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

4. Check that the cell is configured with logical channels.

Command:	**RLCRP :CELL=cell;**
Printout:	CELL RESOURCES

Call test from MS on RXD=B

1. Block all TRX's except for one.

Command:	**RXBLI:MO=RXOTRX-x-y,FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJECT RESULT

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2. Check that one TRX is configured with BCCH and SDCCH.

Command:	**RXCDP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION CONFIGURATION DATA

3. Make a call to an MS in the cell.
4. Check that one TCH is BUSY. Verify the speech connection.

Command:	**RLCRP:CELL=cell;**
Printout:	CELL RESOURCES

Note: Verify ARFCN and TS with the TEMS mobile.

5. Terminate the call.
6. Check that the TCH is released.

Command:	**RLCRP:CELL=cell;**
Printout:	CELL RESOURCES

7. Deblock the blocked TRX's.

Command:	**RXBLE:MO=RXOTRX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT

8. Repeat step 1 on page 270 to step 7 on page 271 until all TRX's in the cell are tested. Document the results in the Test Records.

Restoration of Cell

1. Block all RX's in the TG and bring them out of service.

Command:	**RXBLI:MO=RXOTS-x-y-0&&-7, FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

Command:	**RXBLI:MO=RXORX-x-y,FORCE;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL BLOCKING OF MANAGED OBJEKT RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

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Command:	**RXESE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT OUT OF SERVICE RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

2. Configure diversity parameter to RXD=AB, if diversity is supported.

Command:	**RXMOC:MO=RXORX-x-y,RXD=AB;**
	OR

Configure diversity parameter to RXD=A, if diversity is NOT supported. Repeat for all TRX's.

Command:	**RXMOC:MO=RXORX-x-y,RXD=A;**

Repeat for all TRX's.

3. Bring all RX's in the TG into service and deblock them.

Command:	**RXESI:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT IN SERVICE RESULT
Expected Result:	LOADED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXORX-x-y;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected Result:	EXECUTED

Repeat for all TRX's.

Command:	**RXBLE:MO=RXOTS-x-y-0&&-7;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANUAL DEBLOCKING OF MANAGED OBJECT RESULT
Expected result:	EXECUTED

Repeat for all TRX's.

4. If necessary, enable frequency hopping in the cell.

Command:	**RLCHC :CELL=cell, HOP=ON;**
Expected Result:	EXECUTED

5. Check the status of the cell. Logical channels should be configured.

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Command:	**RLCRP :CELL=cell;**
Printout:	CELL RESOURCES

10.6.3 Call Test to MS from fixed Network

1. Check that one TRX is configured with BCCH and SDCCH:

Command:	**RXCDP:MO=RXOTG-x;**
Printout:	RADIO X-CEIVER ADMINISTRATION CONFIGURATION DATA

2. Make a call from a fixed network phone (at the BSC) to the MS.
3. Check that one TCH is BUSY. Verify the speech connection.

Command:	**RXCRP:CELL=cell;**
Printout:	CELL RESOURCES

Note: Verify ARFCN and TS with the TEMS mobile.

4. Terminate the call.
5. Check that the TCH is released:

Command:	**RXCRP:CELL=cell;**
Printout:	CELL RESOURCES

6. Document the result in the Test Record.
7. Repeat for at least one TRX in every cell.

10.7 Test of External Alarms

The alarm strings are defined in the BTS with OMT by the BTS commissioning staff. The BTS commissioning staff will check that the correct alarm string is received in the RBS and sent to the BSC. If the alarm string received in the BSC corresponds to the alarm receiver in the BTS that was triggered, the definition is correct.

1. Check which AT that is used for alarm printouts (PRCA=64).

Command:	**IOROP;**
Printout:	IO PRINTOUT ROUTING DATA

2. Ask the BTS commissioning staff to simulate an alarm in the BTS site.

Note: Do not activate an alarm classified as severe.

3. Verify that the correct alarm is received in the BSC on the terminal obtained in step 1 on page 273
4. Repeat step 1 on page 273 to step 3 on page 273 for all defined alarms.

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For more information about external alarm testing, *see chapter Site Installation Test.*

10.8 Leaving Site Routines

Save the IDB

The purpose is to save the configuration of the IDB on a diskette.

1. Save the configured IDB on the empty diskette.
2. Label the disc according to Table 45 on page 274.

Table 45 IDB diskette label

Item	Description
<Date>	Current date (YYMMDD)
<rev>	Revision state of the product
<Site Name>	Site name for the RBS
<RBS serial number>	Serial number of the RBS
<backup date>	Date of backup (YYMMDD)

Checklist

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and included in this checklist.

Table 46 Checklist

Checklist		OK
1	Red fault indicators are off.	
2	All operational green LEDs light.	
3	Make sure the RBS is in remote mode (yellow indicator is off or flashing).	
4	Other yellow indicators are off, or flashing if no PCM link is connected.	
5	Test equipment has been disconnected from the RBS.	
6	Radio sub-cabinet and mounting base are free from foreign objects.	
7	All cables are undamaged.	
8	Backup copy of the RBS IDB has been saved on a floppy disk.	
9	All tools have been accounted for.	
10	The cabinet has been locked.	
11	External air intake is free from obstructions.	
12	Defective part packed for shipment (including Repair Delivery Note).	
13	All other necessary paper work has been completed.	

Signature	Date

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10.9 Handover Test

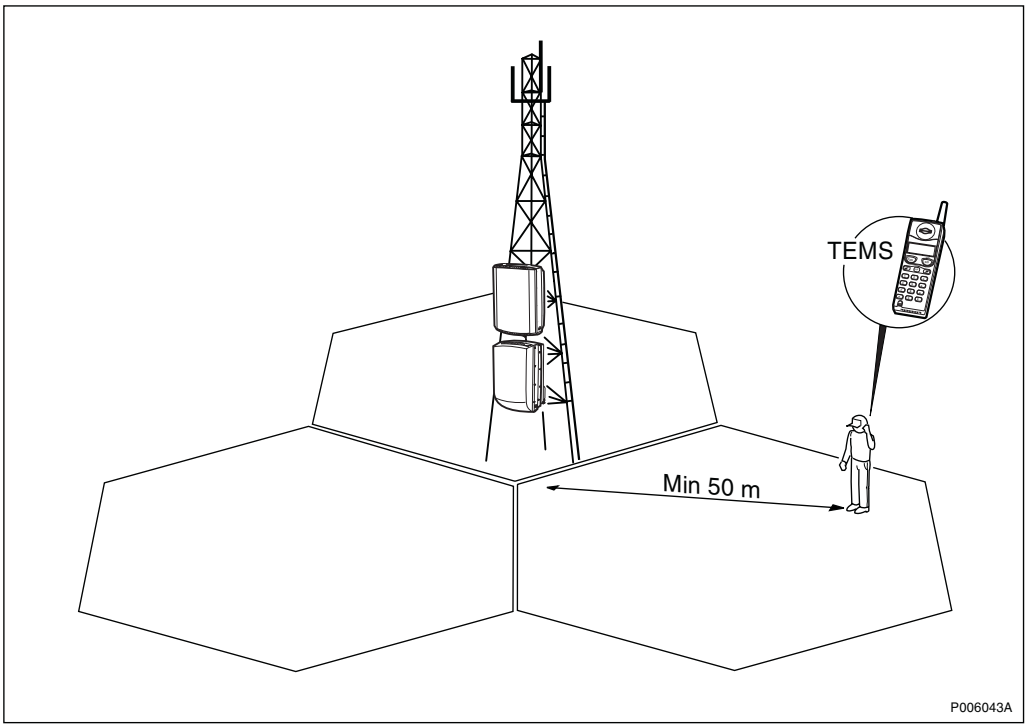

Figure 248 A forced handover test using the TEMS

Purpose: To verify that handovers between cells are functioning at a site.

The test will verify that the coverage of the cell is according to cell planning.

Note: The test should be performed at least 50 m from the BTS, but the driving is not necessary.

1. Start TEMS and establish a connection between the MS and the PC. Choose "Enable connections " from the Select Externals menu.
2. Choose the COM1 port for the MS.
3. Make a call from the test MS.

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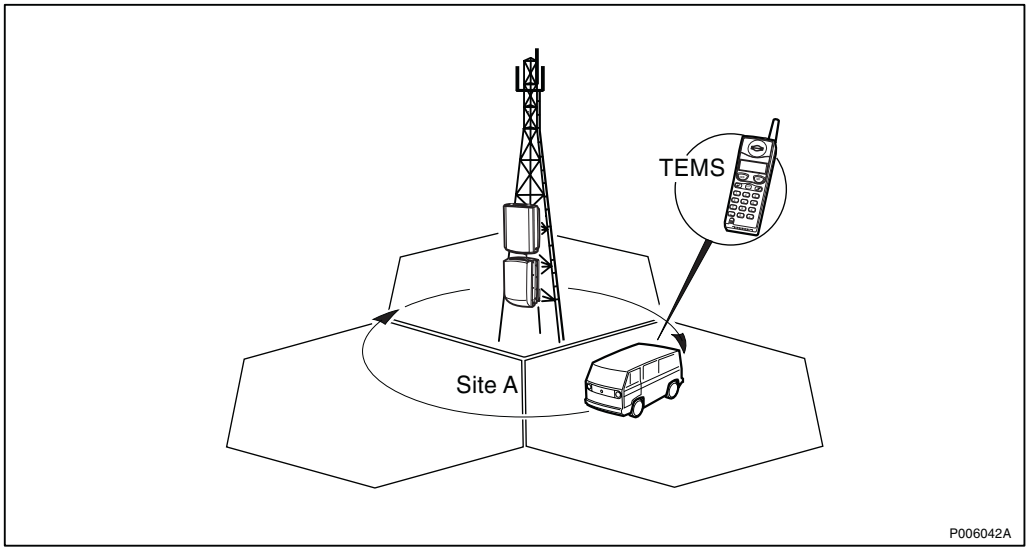

Figure 249 A drive test for checking that the call is handed over between the cells

4. Go between the cells, and check that the call does not disconnect.
5. Start a log by choosing “Start Log” from the “Log” menu.
6. Monitor the signal strength (RxLev) from the BTS with TEMS. Choose "Status information" from the Monitor menu. Select Serving + neighbouring cells.
7. Check that a handover occurs at the cell border.
8. Continue to move through the cells, and verify handover between the cells.
9. Note the result in the Test Record.
10. Close the log and save it.
11. If no handover occurs at a cell border, contact the BSC personnel

10.10 Helpful Hints

In this chapter you will find helpful information about:

- Setting the RBS in remote mode
- Reference DT-files
- Example of Exchange Data for a 2–TRX cabinet
- Example of Exchange Data for a 6–TRX cabinet
- LAPD Concentration Data
- BTS PCM Supervision
- Digital Path Data
- Installation of BTS Software in IOG
- Managed Object Hierarchy
- Managed Object States

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10.10.1 Setting the RBS in remote mode

Follow this procedure if you want to set the RBS in remote mode:

- Push the Local/Remote button on the RBS to change mode.

  The Local/Remote mode indicator will start flashing to indicate that the mode has been changed and will keep flashing until contact has been established with the BSC (then the MO CF has been taken into service).

- Wait until contact has been established with the BSC, the Local mode indicator will then be turned off.
- If contact has not been established within ten minutes, turn off the power to the RBS and try again.
- The RBS commissioning staff must have contact with the BSC staff.

10.10.2 Reference DT-files

The initial data for all internal cells is in DT-file: 83000.

The external cell data is in DT-file: 83500.

Data for each cell and TG are in DT-files 85xxx and 87xxx, where xxx is a consecutive number, indicating the site.

Neighboring cell data for each cell are in DT-files 86xxx, where xxx is a consecutive number, indicating the site.

Data for definition of Abis paths is in the DT-file 94xxx.

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10.10.3 Example of Exchange data for a 2-TRX cabinets

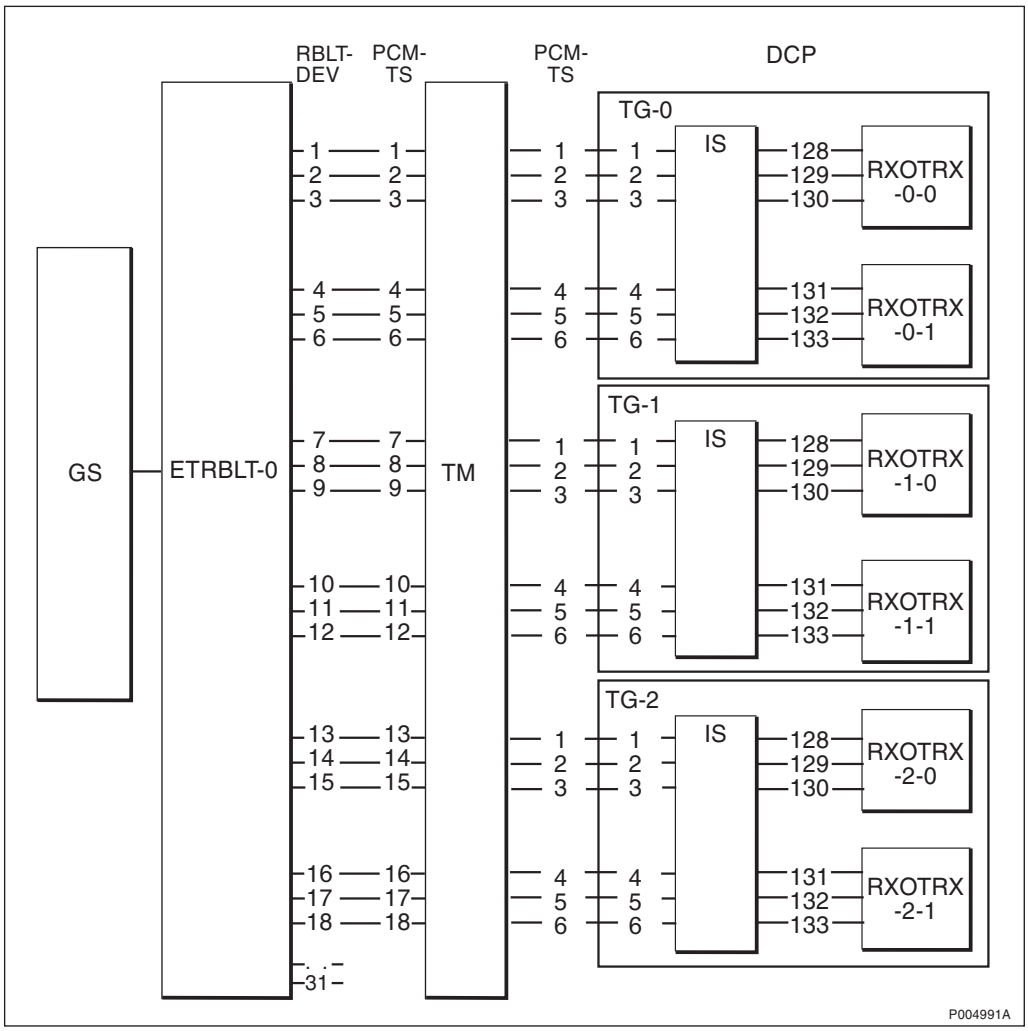

Figure 250 An example of a 2–TRX cabinet

This is an example of how the exchange data can be arranged for three cascade connected 2-TRX cabinets:

Definition of Managed Objects

Command:	**RXMOI:MO=RXOTG-0,COMB=HYB,RSITE=SITE1,SWVER=swver;**
Command:	**RXMOI:MO=RXOCF-0,TEI=62;**
Command:	**RXMOI:MO=RXOIS-0;**
Command:	**RXMOI:MO=RXOTF-0,TFMODE=SA;**
Command:	**RXMOI:MO=RXOTRX-0-0,TEI=0,DCP1=128,DCP2=129&130;**
Command:	**RXMOI:MO=RXOTRX-0-1,TEI=1,DCP1=131,DCP2=132&133;**

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Command: **RXMOI:MO=RXOTX-0-0&-1,BAND=GSM,MPWR=40;**

Command: **RXMOI:MO=RXORX-0-0&-1,BAND=GSM,RXD=AB;**

Command: **RXMOI:MO=RXOTS-0-0-0&&-7;**

Command: **RXMOI:MO=RXOTS-0-1-0&&-7;**

Command: **RXMOI:MO=RXOTG-1,COMB=HYB,RSITE=SITE2,SWVER=swver;**

Command: **RXMOI:MO=RXOCF-1,TEI=62;**

Command: **RXMOI:MO=RXOIS-1;**

Command: **RXMOI:MO=RXOTF-1,TFMODE=SA;**

Command: **RXMOI:MO=RXOTRX-1-0,TEI=0,DCP1=128,DCP2=129&130;**

Command: **RXMOI:MO=RXOTRX-1-1,TEI=1,DCP1=131,DCP2=132&133;**

Command: **RXMOI:MO=RXOTX-1-0&-1,BAND=GSM,MPWR=40;**

Command: **RXMOI:MO=RXORX-1-0&-1,BAND=GSM,RXD=AB;**

Command: **RXMOI:MO=RXOTS-1-0-0&&-7;**

Command: **RXMOI:MO=RXOTS-1-1-0&&-7;**

Command: **RXMOI:MO=RXOTG-2,COMB=HYB,RSITE=SITE3,SWVER=swver;**

Command: **RXMOI:MO=RXOCF-2,TEI=62;**

Command: **RXMOI:MO=RXOIS-2;**

Command: **RXMOI:MO=RXOTF-2,TFMODE=SA;**

Command: **RXMOI:MO=RXOTRX-2-0,TEI=0,DCP1=128,DCP2=129&130;**

Command: **RXMOI:MO=RXOTRX-2-1,TEI=1,DCP1=131,DCP2=132&133;**

Command: **RXMOI:MO=RXOTX-2-0&-1,BAND=GSM,MPWR=40;**

Command: **RXMOI:MO=RXORX-2-0&-1,BAND=GSM,RXD=AB;**

Command: **RXMOI:MO=RXOTS-2-0-0&&-7;**

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Command: **RXMOI:MO=RXOTS-2-1-0&&-7;**

Definition of Abis paths

Command: **RXAPI:MO=RXOTG-0,DEV=RBLT-1&&-6,DCP=1&&6;**

Command: **RXAPI:MO=RXOTG-1,DEV=RBLT-7&&-12,DCP=1&&6;**

Command: **RXAPI:MO=RXOTG-2,DEV=RBLT-13&&-18,DCP=1&&6;**

Note: Definition of Managed Objects DP and CON. (These two MO's are optional and described in*Section 10.10.5 on page 283 and Section 10.10.6 on page 283.*)

Note: In this case the Transport Modules (TM) must be loaded with the correct data. This should be done by the BTS Commissioning Staff.

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10.10.4 Example of Exchange data for a 6-TRX cabinet

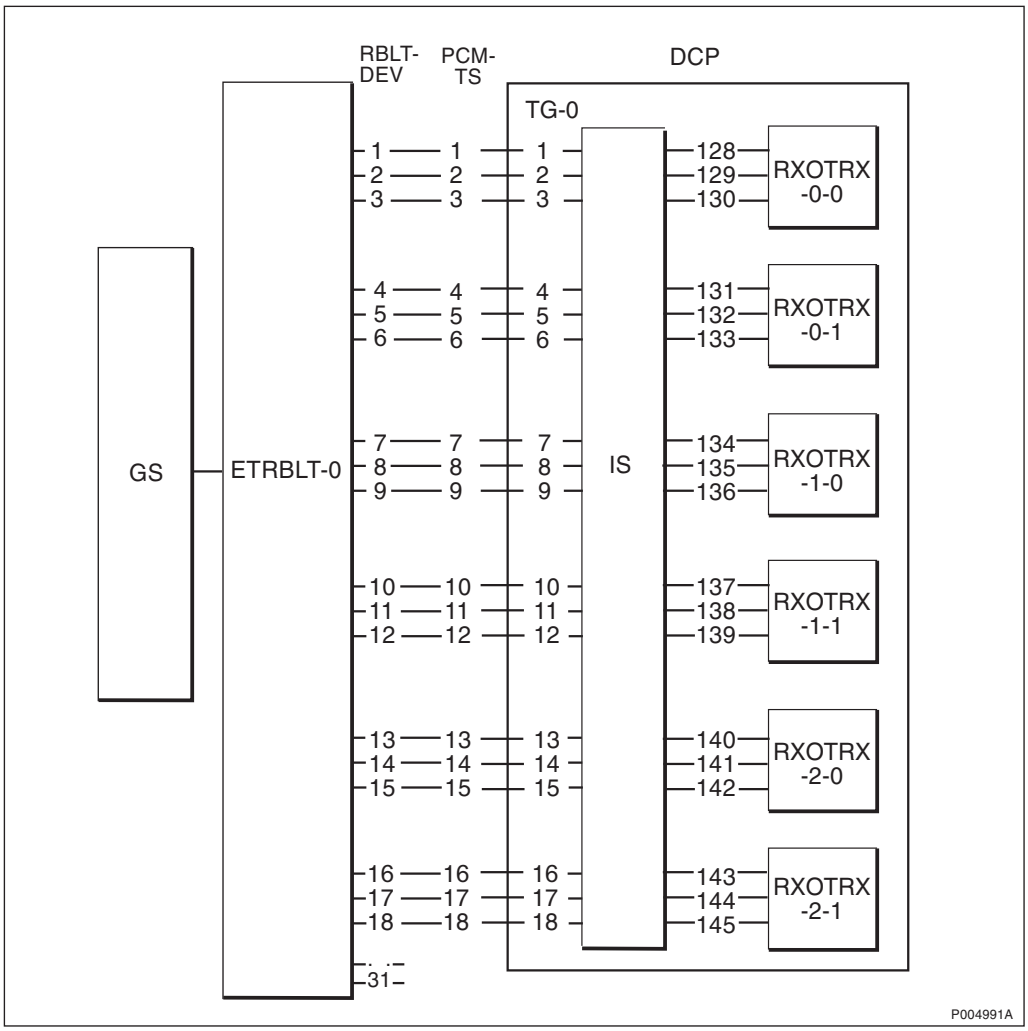

Figure 251 An example of an 6–TRX cabinet

This is an example of how the exchange data can be arranged for a 6-TRX cabinet:

This is set up by RXAPI on TG level for the IS towards the BSC, and with RXMOI on TRX level for the IS towards the TRX.

Definition of Managed Objects

1. Create the MOs in the RBS equipment.

Command:	**RXMOI:MO=RXOTG-0,COMB=HYB,RSITE=SITE1,SWVER=swver;**
Command:	**RXMOI:MO=RXOCF-0,TEI=62;**
Command:	**RXMOI:MO=RXOCON-0,DCP=64&&87;**
Command:	**RXMOI:MO=RXOIS-0;**
Command:	**RXMOI:MO=RXOTF-0,TFMODE=SA;**

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Command: **RXMOI:MO=RXOTRX-0-0,TEI=0,DCP1=128,DCP2=129&130;**

Command: **RXMOI:MO=RXOTRX-0-1,TEI=1,DCP1=131,DCP2=132&133;**

Command: **RXMOI:MO=RXOTRX-0-2,TEI=2,DCP1=134,DCP2=135&136;**

Command: **RXMOI:MO=RXOTRX-0-3,TEI=3,DCP1=137,DCP2=138&139;**

Command: **RXMOI:MO=RXOTRX-0-4,TEI=4,DCP1=140,DCP2=141&142;**

Command: **RXMOI:MO=RXOTRX-0-5,TEI=5,DCP1=143,DCP2=144&145;**

Command: **RXMOI:MO=RXOTX-0-0&&-5,BAND=GSM,MPWR=40;**

Command: **RXMOI:MO=RXORX-0-0&&-5,BAND=GSM,RXD=AB;**

Command: **RXMOI:MO=RXOTS-0-0-0&&-7;**

Command: **RXMOI:MO=RXOTS-0-1-0&&-7;**

Command: **RXMOI:MO=RXOTS-0-2-0&&-7;**

Command: **RXMOI:MO=RXOTS-0-3-0&&-7;**

Command: **RXMOI:MO=RXOTS-0-4-0&&-7;**

Command: **RXMOI:MO=RXOTS-0-5-0&&-7;**

2. If there are more than one cell in this transceiver group, connect the cells to each TRX. Perform the following commands for each TRX:

Command: **RXMOC:MO=RXOTRX-0-0, CELL=TEST1;**

Command: **RXMOC:MO=RXOTX-0-0, CELL=TEST1;**

Definition of Abis paths

Command: **RXAPI:MO=RXOTG-0,DEV=RBLT-1&&-18,DCP=1&&18;**

Note: Definition of Managed Objects DP and CON. (These two MOs are optional and described in *Section 10.10.5 on page 283 and Section 10.10.6 on page 283.)*

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10.10.5 LAPD Concentration Data

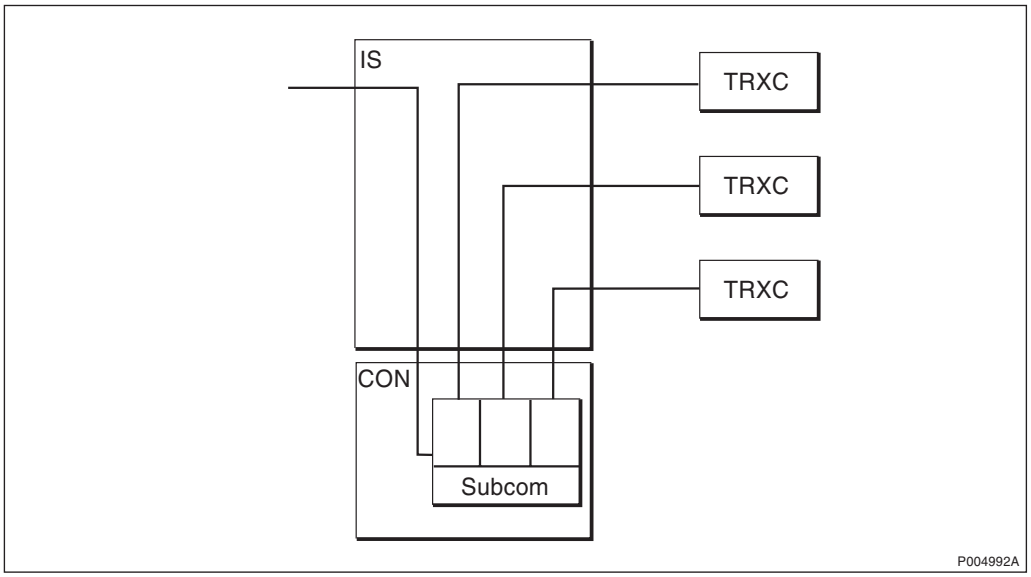

Figure 252 LAPD Concentration in RBS 2000

Command: **RXMOC:MO=RXOTG-0,CONFACT=confact;**

Command: **RXMOC:MO=RXOCF-0,SIG=CONC;**

Command: **RXMOI:MO=RXOCON-0,DCP=64&&87;**

10.10.6 BTS PCM Supervision

Command: **RXMOI:MO=RXODP-0-0,DEV=RXODPI-0;**

Command: **DTDII:DIP=modip,DEV=RXODPI-0;**

10.10.7 Digital Path Data

The Digital Path used towards an RBS 2000 site should be defined according to the following:

Command: **DTDII:DIP=RBLTx,SNT=ETRBLT-x;**

Command: **DTIDC:DIP=RBLTx,MODE=0,INACT=0, MULTFS=00,CRC=0;**

CRC=0	Cyclic Redundancy Check will NOT be performed
CRC=1	Cyclic Redundancy Check will be performed

If CRC=1, the BTS commissioning staff has to set a parameter in the BTS with OMT, otherwise CRC will NOT be performed. In CME20 R6 and later versions, it will not be possible to set the CRC parameter from the BSC.

Note: The parameter MODE should always be set to 0.

10.10.8 Installation of BTS Software in IOG

The number of subfiles may differ, usually 3-6 subfiles are used.

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- btsfilename-HEADER
- btsfilename-LF1
- btsfilename-LF2
- btsfilename-LF3
- and so on...

It is delivered on a number of floppy or optical discs. Follow information provided with the BTS SW for information on how to load it. If such information is missing follow the following hints or look for a proper OPI.

1. Mount the disc(s) on the IOG with INVOL.
2. Create a file on the HD of the IOG.

   Command: **INMCT:SPG=0;**

   Command: **INFII:FILE=btsfilename,VOL=BTSVOLUMSW, RLENGTH=512, TYPE=SEQ, FCLASS=CMP, EXP=10, SIZE=1;**

3. Check which subfiles there are on the floppy's.

   Command: **INFIP:FILE=FD0A1/FD0B1;**

4. Copy the files (Repeat for all subfiles on the diskettes).

   Command: **INFET:FILE1=FHEADER,NODE1=A,IO1=FD-1,FILE2=btsfilename-HEADER;**

   Command: **INFET:FILE1=FLF1,NODE1=A,IO1=FD-1,FILE2=btsfilename-LF1;**

   Command: **INFET:FILE1=FLF2,NODE1=A,IO1=FD-1,FILE2=btsfilename-LF2;**

   Command: **INFET:FILE1=FLF3,NODE1=A,IO1=FD-1,FILE2=btsfilename-LF3;**

5. Unload and dismount the disc(s).

   Command: **INVOE;**

Note: Always repeat step 1 on page 284 and step 5 on page 284 every time you swap discs.

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10.10.9 Managed Object Hierarchy

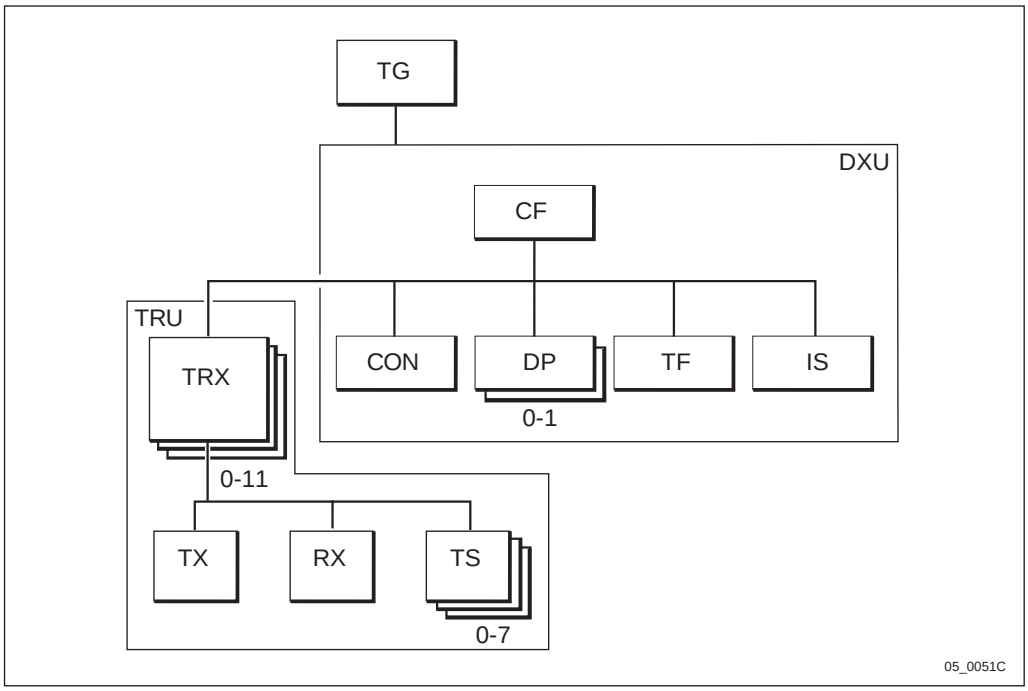

Figure 253 Managed Object (MO) hierarchy for RBS 2000 series

The Managed Objects CF, TF, DP, CON and IS corresponds to the hardware unit DXU in the BTS.

The Managed Objects TRX, TX, RX and TS corresponds to the hardware unit TRU in the BTS.

The Managed Object TG has no corresponding hardware in the BTS.

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10.10.10 Managed Object States

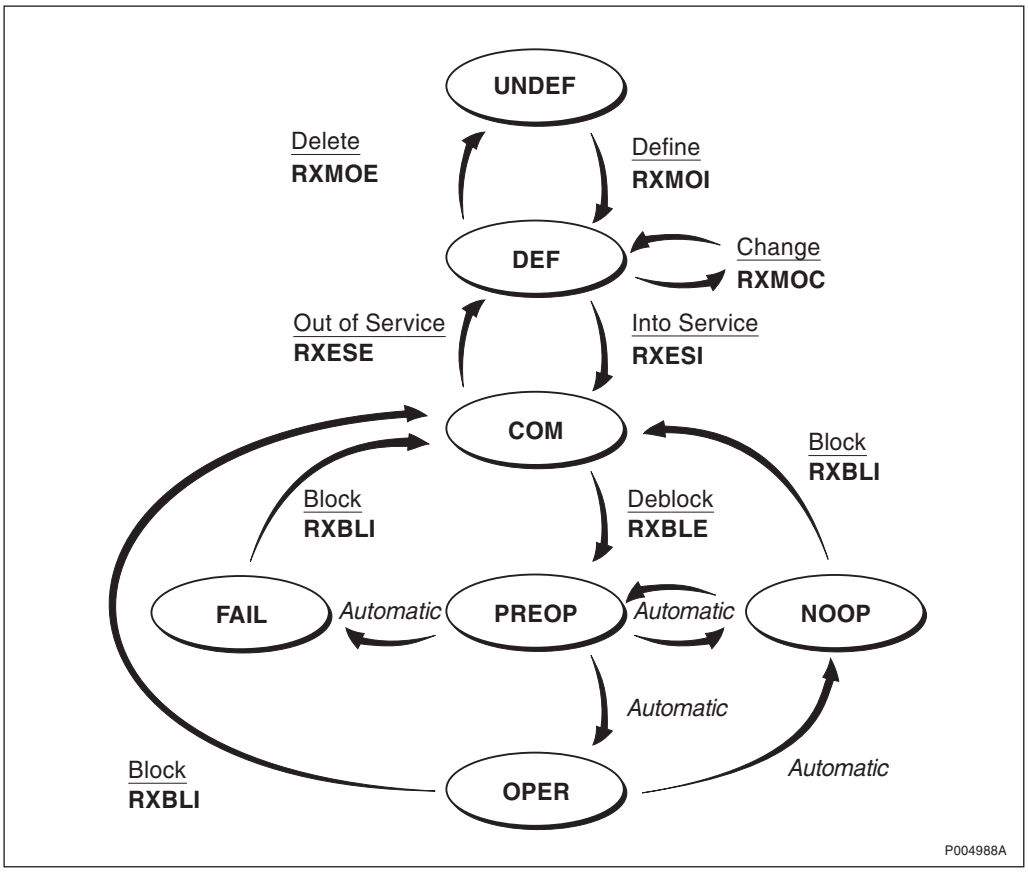

Figure 254 Description of the relation between the different managed object states

The current state of all MO's can be checked using the command:

Command:	**RXMSD:MO=mo;**
Printout:	RADIO X-CEIVER ADMINISTRATION MANAGED OBJECT STATE

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10.11 Test Records

10.11.1 Network Element Integration Test

NE Commissioning GSM -

Date.	Site Name:
Site No:	Cell configuration:
RBS type:	Testers Name:

NETWORK ELEMENT INTEGRATION TEST

AIR INTERFACE CALL TEST

TRX	Cell ID	ARFCH	BSIC	TS0	TS1	TS2	TS3	TS4	TS5	TS6	TS7
1											
2											
3											
4											
5											
6											

	Cell A		Cell B		Cell C	
Antenna Attenvator Settings	☐		☐		☐	
Land to MS-Call	☐		☐		☐	
Handover test	☐ A to B	☐ A to C	☐ B to A	☐ B to C	☐ C to A	☐ C to B
External Alarm Test	☐					
Concluding Routines	☐					

1. Update and save the IDB
2. Check the Software version and note it below.
3. Checklist before ending test.

Init: _____ Appl: _____

Remarks: _____

_____

P005554A

Figure 255 Test Record for the Network Element Integration

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10.11.2 Network Element Acceptance Certificate

NETWORK ELEMENT ACCEPTANCE CERTIFICATE

This is to certify that Ericsson Radio Systems AB has delivered, installed and tested the Network Element ..... as defined in contract .....

The Network element acceptance has been performed in accordance with the procedures described in the above mentioned contract. Further reference should be made to the acceptance documents. The Network element passed acceptance with remarks per attached test report.

Number of remarks within Ericsson´s responsibilities, that have been made on this site:.....

Date:.....

The Buyer	The Contractor
Company Name:	Company Name: Ericsson Radio Systems AB
Person Responsible:	Person Responsible:

P004631B

Figure 256 Example of a Network Element Acceptance Certificate

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11 Fault Handling

11.1 Fault Tracing Hints

Table 47 Fault tracing hints

Fault	Action
Fault LED is flashing.	• Reset the RBS (CPU Reset button). • Check BTS Software. • Install IDB.
The RBS cannot be integrated into the system.	• Make sure that the transmission cable between the RBS and the Installation Box is correctly connected.
The OMT will not install IDB.	• Push the local/remote button until the RBS is in local mode. • Push the CPU Reset button and try again.
The OMT will not read IDB.	• Check that the cable is correctly connected. • Reset the RBS (CPU Reset button).
The RBS will not take CF into service (when using a BSC simulator to make a test call).	• Check that the cables are correctly connected. • Make sure that the RBS is in remote mode. • Reset the CPU (CPU Reset button).
The OMT will not define alarm inlets.	• Disconnect the OMT.
Memory Corrupted.	Use the OMT. • For faults Non-Volatile Memory Corrupted and RBS Database Corrupted/Inconsistent, reset by installing a new IDB. • If this fault arises during Function change or Program Load, wait until the Function change or Program Load is completed. • If the RBS does not recover automatically, check the files and repeat the Function change or Program Load.
Wrong IDB.	• Install the correct IDB, using the OMT.
PCM fails when installing BTS SW with simulator.	• Check that the PCM cables are correctly connected. (The TX cable has voltage.) • Shift the PCM cables.
Battery fault.	• Battery disconnected or faulty. • Low battery DC voltage.
PSA fault.	• If the RBS indicates Battery Fault, but the PBC shows no alarms, replace the PSA.
The PBC cannot start up.	• Make sure that all cables are correctly connected and the fuses are not defective.

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11.2 Fault Code List

This chapter describes faults reported to the BSC and HW units suspected of causing the fault.

Where applicable, the fault code lists indicate faults with restricted validity for product release R6 and later in CME 20, and also for the micro RBSs: RBS 2301 and RBS 2302.

When using this chapter for CMS 40 the conversion table below applies.

Table 48 Relation of product releases in CME 20 and CMS 40

CME 20		CMS 40
R6.0	↔	R2
R6.1	↔	R3
R7	↔	R7

11.2.1 Terminology

The following terminology is used throughout this chapter.

Fault Number

The fault number is identical with the bit position in the fault map reported over the Abis interface.

Internal Fault Map Class 1A (I1A)

Faults reported in this class are faults that affect MO functionality. Faulty HW is part of the signalling MO.

Internal Fault Map Class 1B (I1B)

Faults reported in this class are faults that affect MO functionality. The origin of the fault is external to the signalling MO.

Internal Fault Map Class 2A (I2A)

Faults reported in this class are faults that do not affect MO functionality. Faulty HW is part of the signalling MO.

External Condition Map Class 1 (EC1)

Conditions reported in this class are conditions that affect MO functionality. The conditions are TG external.

External Condition Map Class 2 (EC2)

Conditions reported in this class are conditions that do not affect MO functionality. The conditions are TG external.

Replacement Unit Map (RU Map)

Units reported in this map are HW units suspected of causing the faults in the internal fault maps described above.

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Logical RU

A logical RU is defined as a unit that can be referred to but is not a single physical unit. There are four different kinds of logical RUs:

1. **Buses**. These are often referred to as a single physical unit but are implemented in the backplane of the cabinet with cables. When a bus is pointed out in the RU map it should be understood that faulty HW can be any unit connected to the bus, or the bus, itself. Logical bus RUs are:

   - X bus
   - Local bus
   - Timing bus
   - CDU bus
   - Power communication loop

2. **Antennas**. (Not applicable for RBS 2301 and RBS 2302). A logical antenna means the whole signal path between the Transmitter/Receiver and the physical antenna. The Logical antenna RUs is:

   - Antenna

3. **Environment**. This RU records conditions that cannot be affected from the base station. There are two groups under this RU:

   - Power, that handles external power
   - Climate, that handles humidity and temperature

   For example, if the temperature in the cabinet is too high or the incoming AC mains power is out of range, the logical RU "Environment"is denoted as faulty.

   Logical RU is:

   - Environment

4. **RBS DB**. The RBS database is regarded as a replaceable unit despite it is not a physical unit. It comprises the data in the database only, not the medium it resides in.

Logical RUs in 1 and 2 above are pointed out when the analysis fails to give a more detailed localization of the fault. However, the ambition is still not to point out a logical RU.

11.2.2 Decoding of Fault Maps

Note: No decoding of Fault Maps is necessary from RBS 2000 release HRB 105 01/2 revision R7. The Fault Maps will be presented in plain text (Fault Type).

The following instructions can be used when a fault map sent to OMC must be translated into a decimal number. An example is when the error log has been printed.

All fault and replacement unit codes consist of a number of hexadecimal digits, in most cases twelve. These twelve digits represent

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a map that consists of 48 bits. Each bit represents a decimal number and can be translated into a description by using the fault code list and the replacement unit map.

Excepted from this rule are codes for external faults. These codes contain only four hexadecimal digits, which means 16 bits. The decoding principle is the same as for the twelve-digit code.

Example 1

SO CF has reported an internal class 1A fault. The fault code is "000000004100".

Table 49 Fault code "000000004100"

47-44	43-40	39-36	35-32	31-28	27-24	23-20	19-16	15-12	11-8	7-4	3-0
0	0	0	0	0	0	0	0	4	1	0	0
0000	0000	0000	0000	0000	0000	0000	0000	0100	0001	0000	0000

Bits number 8 and 14 are set to "1", which means that faults number 8 and 14 are active in the CF class 1A fault list. Translating the numbers by using the information in the fault list gives the two faults "Timing unit VCO fault" (fault number 8) and "Local bus fault" (fault number 14).

Example 2

SO TRXC has reported a replacement unit code, "000000000001".

Table 50 Fault code "000000000001"

47-44	43-40	39-36	35-32	31-28	27-24	23-20	19-16	15-12	11-8	7-4	3-0
0	0	0	0	0	0	0	0	0	0	0	1
0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0001

Bit number 0 is set to "1", which means that replacement unit 0 is suspected of being faulty. Translating this number by using the replacement unit map for SO TRXC will give us the information "Suspected replacement unit is TRU".

Unused Decoding Table

Make a copy of this table and use it as a tool when decoding fault codes and replacement unit codes.

Table 51 Unused decoding table

47-44	43-40	39-36	35-32	31-28	27-24	23-20	19-16	15-12	11-8	7-4	3-0

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Hex to Bin Table

Hex	Bin	Hex	Bin
0	0000	8	1000
1	0001	9	1001
2	0010	A	1010
3	0011	B	1011
4	0100	C	1100
5	0101	D	1101
6	0110	E	1110
7	0111	F	1111

11.2.3 SO Fault Lists

Fault codes on the Abis interface are defined per MO. The SO RU map and the I1A/I2A fault maps should be read together. The SO fault map denotes which fault it is, and the RU map denotes where the fault is located.

An AO I1B fault has a corresponding SO I2A fault. So by reading the I2A fault map and the RU map for SO CF or SO TRXC, the HW that is causing the AO I1B fault can be found. This is the case when BTS internal HW affects a single AO.

The AO is not allowed to report the HW itself since this task is assigned to the HW-responsible SO. One could say that the consequence is reported by the AO I1B fault map and the cause is reported by the SO I1A/I2A fault maps and the RU map.

SO CF, internal fault map class 1A

Fault No.	Fault type	Remark
0	Reset, failed restart attempt	
1	Reset, power on	
2	Reset, switch	
3	Reset, watchdog	
4	Reset, SW fault	
5	Reset, RAM fault	
6	Reset, internal function change	
7	X bus fault	
8	Timing unit VCO fault	
9	Timing bus fault	
10	Indoor temperature out of safe range	
11		
12	DC voltage out of range	
13		

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Fault No.	Fault type	Remark
14	Local bus fault	
15	RBS database corrupted	R6 and later
16	RU database corrupted	
17	HW and IDB inconsistent	
18	Internal configuration failed	
19	Indoor temperature above safe range	Micro RBS only
20	Indoor temperature below safe range	Micro RBS only
-		
-		
47		

SO CF, internal fault map class 1B

Not used.

SO CF, internal fault map class 2A

Fault No.	Fault type	Remark
0	Reset, failed restart attempt	
1	Reset, power on	
2	Reset, switch	
3	Reset, watchdog	
4	Reset, SW fault	
5	Reset, RAM fault	
6	Reset, internal function change	
7	RXDA amplifier current fault	R6 and later
8	VSWR limits exceeded	
9	Power limits exceeded	R6 and later
10	DXU optional EEPROM checksum fault	
11	ALNA fault	
12	RX maxgain/mingain violated	R6 and later
13	Timing unit VCO ageing	
14	CDU supervision/communication lost	
15	VSWR/Output power supervision lost	R6 and later
16	Indoor temperature out of normal conditional range	
17	Indoor humidity	
18	DC voltage out of range	
19	Power system in stand-alone mode	
20	External power fault	
21	Internal power capacity reduced	

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Fault No.	Fault type	Remark
22	Battery backup capacity reduced	
23	Climate capacity reduced	R6 and later
24	CU HW fault	R6 and later
25	Heater capacity reduced	
25	Loadfile missing in DXU or ECU	R7
26	Climate sensor fault	
27	System voltage sensor fault	
28	A/D converter fault	
29	Varistor fault	
30	Local bus fault	
31	High-frequency software fault	
32	Non-volatile memory corrupted	
33	RX diversity lost	
34	Output voltage fault	
35	Optional synchronisation source	
36	RU database corrupted	
37	Circuit breaker tripped	
38	Default values used	
39	RX cable disconnected	
40	Reset, DXU link lost	
41	Lost communication to TRU	R6 and later
42	Lost communication to ECU	R6 and later
43	Internal configuration failed	R6 and later
44	Indoor temperature above normal conditional range	Micro RBS only
45	Indoor temperature below normal conditional range	Micro RBS only
46	DB parameter fault	R7
47	Auxiliary Equipment Fault	R7 only

SO CF, external condition map class 1

Fault No.	Fault type
0	
-	
-	
4	L/R SWI (BTS in local mode)
5	L/R TI (Local to remote while link lost)
-	
-	
15	

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SO CF, external condition map class 2

Fault No.	Fault type
0	
-	
-	
-	
9	RBS door (RBS cabinet door open)
-	
-	
15	

SO CF, replacement unit map

No.	Replaceable unit	Remark
0	DXU	
1	ECU	
2	Micro RBS	
3		
4		
5	CDU	
6	BFU	
7	PSU	
8	CDU_Cos	
9	BDM	
10	ACCU	
11	Active cooler	
12	ALNA A	
13	ALNA B	
14	Battery	
15	Fan	
16	Heater	
17	Heat exchanger external fan	
18	Heat exchanger internal fan	
19	Humidity sensor	
20		
21	Temperature sensor	
22	CDU HLOUT HLIN cable	
23	CDU RX in cable	
24	CU	
25	DU	
26	FU	
27	FU CU PFWD cable	

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No.	Replaceable unit	Remark
28	FU CU PREFL cable	
29	CAB HLIN cable	
30	CDU bus	
31	Environment	
32	Local bus	
33	Power communication loop	
34	RBS DB	R7
34		
35		
36	Timing bus	
37		
38		
39	X bus	
40	Antenna	
-		
-		
47		

SO TRXC, internal fault map class 1A

Fault No.	Fault type	Remark
0	Reset, failed restart attempt	
1	Reset, power on	
2	Reset, switch	
3	Reset, watchdog	
4	Reset, SW fault	
5	Reset, RAM fault	
6	Reset, internal function change	
7		
8	Timing reception fault	
9	Signal processing fault	
10	Tora Dannie communication fault	
11	DSP CPU communication fault	
12	Terrestrial traffic channel fault	
13	RF loop test fault	
14	RU database corrupted	
15	X bus communication fault	
16	Initiation fault	
17	X-interface fault	
18	DSP fault	
19	Reset, DXU link lost	
20	HW and IDB inconsistent	R6 and later

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Fault No.	Fault type	Remark
21	Internal configuration failed	R6 and later
-		
-		
47		

SO TRXC, internal fault map class 1B

Fault No.	Fault type	Remark
0	CDU not usable	R6 and later
1	Indoor temperature out of safe range	
2		
3	DC voltage out of range	
4	Indoor temperature above safe range	
5	Indoor temperature below safe range	
-		
-		
47		

SO TRXC, internal fault map class 2A

Fault No.	Fault type	Remark
0	RX cable disconnected	
1	RX EEPROM checksum fault	
2	RX configuration table checksum fault	
3	RX synthesizer unlocked	
4	RX internal voltage fault	
5	Astra Dixie communication fault	
6	Astra Tracy communication fault	
7	TX EEPROM checksum fault	
8	TX configuration table checksum fault	
9	TX synthesizer unlocked	
10	TX internal voltage fault	
11	TX high temperature	
12	TX output power limits exceeded	
13	TX saturation	
14	Voltage supply fault	
15	VSWR/output power supervision lost	
16	Non-volatile memory corrupted	
17	Loadfile missing in TRU	R7
18	DSP fault	

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Fault No.	Fault type	Remark
19	High-frequency software fault	
20	RX initiation fault	
21	TX initiation fault	
22	CDU bus communication fault	
23	Default values used	
24		
25	TX maximum power restricted	
26	DB Parameter Fault	R7
-		
-		
47		

SO TRXC, external condition map class 1

Fault No.	Fault type
0	
-	
-	
4	L/R SWI (TRU in local mode)
5	L/R TI (Local to remote while link lost)
-	
-	
15	

SO TRXC, external condition map class 2

Not used.

SO TRXC, replacement unit map

No.	Replaceable unit	Remark
0	TRU	
1		
2	Micro RBS	
-		
-		
10	CDU to TRU PFWD cable	
11	CDU to TRU PREFL cable	
12	CDU to TRU RXA cable	
13	CDU to TRU RXB cable	
-		

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No.	Replaceable unit	Remark
-		
47		

11.2.4 AO Fault Lists

Fault codes on the Abis interface are defined per MO. The SO RU map and the I1A/I2A fault maps should be read together. The SO fault map denotes which fault it is, and the RU map denotes where the fault is located.

An AO I1B fault has a corresponding SO I2A fault. So by reading the I2A fault map and the RU map for SO CF or SO TRXC, the HW that is causing the AO I1B fault can be found. This is the case when BTS internal HW affects a single AO.

The AO is not allowed to report the HW itself since this task is assigned to the HW-responsible SO. One could say that the consequence is reported by the AO I1B fault map and the cause is reported by the SO I1A/I2A fault maps and the RU map.

AO CON, internal fault map class 1A (R6 and later)

Not used.

AO CON, internal fault map class 1B (R6 and later)

Not used.

AO CON, internal fault map class 2A (R6 and later)

Not used.

AO CON, external condition map class 1 (R6 and later)

Fault No.	Fault type
0	
-	
-	
8	LAPD Q CG (LAPD queue congestion)
-	
-	
15	

AO CON, external condition map class 2 (R6 and later)

Fault No.	Fault type
0	
-	

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Fault No.	Fault type
-	
8	LAPD Q CG (LAPD queue congestion)
-	
-	
15	

AO CON, replacement unit map (R6 and later)

Not used. *See Section SO CF, replacement unit map on page 296,* for possible HW causing the fault.

AO TS, internal fault map class 1A

Not used

AO TS, internal fault map class 1B

Not used

AO TS, internal fault map class 2A

Not used

AO TS, external condition map class 1

Fault No.	Fault type
0	
1	
2	
3	TRA (Remote transcoder communication lost)
-	
-	
15	

AO TS, external condition map class 2

Not used

AO TS, replacement unit map

Not used.

AO TF, internal fault map class 1A

Not used.

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AO TF, internal fault map class 1B

Fault No.	Fault type
0	Optional synchronisation source
1	DXU optional EEPROM checksum fault
-	
-	
47	

AO TF, internal fault map class 2A

Not used.

AO TF, external condition map class 1

Fault No.	Fault type
0	
1	PCM sync (no usable PCM reference)
-	
-	
15	

AO TF, external condition map class 2

Fault No.	Fault type
0	
1	PCM sync (no usable PCM reference)
-	
-	
15	

AO TF, replacement unit map

Not used. *See Section SO CF, replacement unit map on page 296,* for possible HW causing the fault.

AO TX, internal fault map class 1A

Fault No.	Fault type	Remark
0	TX offending	R6 and later
-		

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Fault No.	Fault type	Remark
-		
47		

AO TX, internal fault map class 1B

Fault No.	Fault type	Remark
0	CU not usable	
1	CDU VSWR limits exceeded	
2	CDU output power limits exceeded	
3		
4	TX antenna VSWR limits exceeded	
5		
6	TX EEPROM checksum fault	
7	TX configuration table checksum fault	
8	TX synthesizer A/B unlocked	
9	TX synthesizer C unlocked	
10	Astra Tracy communication fault	
11	TX internal voltage fault	
12	TX high temperature	
13	TX output power limits exceeded	
14	TX saturation	
15	Voltage supply fault	
16	Power unit not ready	
17	TX initiation fault	
18	CU HW fault	R6 and later
19	CU SW load/start fault	R6 and later
20	CU input power fault	R6 and later
21	CU park fault	R6 and later
22	VSWR/Output power supervision lost	R6 and later
23	CU reset, power on	R6 and later
24	CU reset, communication fault	R6 and later
25	CU reset, watchdog	R6 and later
26	CU fine tuning fault	R6 and later
27	TX maximum power restricted	
-		
-		
47	TX Auxiliary Equipment Fault	R7 only

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AO TX, internal fault map class 2A

Fault No.	Fault type	Remark
0	TX diversity fault	
-		
-		
47		

AO TX, external condition map class 1

Not used.

AO TX, external condition map class 2

Not used.

AO TX, replacement unit map

Not used. *See Section SO CF, replacement unit map on page 296,* and *Section SO TRXC, replacement unit map on page 299,* for possible HW causing the fault.

AO RX, internal fault map class 1A

Not used.

AO RX, internal fault map class 1B

Fault No.	Fault type	Remark
0	RXDA amplifier current fault	R6 and later
1	ALNA fault	
2		
3	RX EEPROM checksum fault	
4	RX configuration table checksum fault	
5	RX synthesizer A/B unlocked	
6	RX synthesizer C unlocked	
7	Astra Dixie communication fault	
8	RX internal voltage fault	
9	RX cable disconnected	
10	RX initiation fault	
11	CDU output voltage fault	
-		
-		
47	RX Auxiliary Equipment Fault	R7 only

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AO RX, internal fault map class 2A

Not used.

AO RX, external condition map class 1

Not used.

AO RX, external condition map class 2

Not used.

AO RX, replacement unit map

Not used. *See Section SO CF, replacement unit map on page 296,* and *Section SO TRXC, replacement unit map on page 299,* for possible HW causing the fault.

AO IS

AO IS is not supervised.

AO DP (R6 and later)

AO DP is not supervised.

Note: The Digital Path is supervised by PCM supervision.

11.3 Trouble Report

A trouble report should be written when system components are not operating as expected or when disturbances occur repeatedly. It should not be written for occasional hardware failures. A trouble report should also be written when a fault is found in this manual.

When writing a trouble report, always include as much information as possible. Write the trouble report as soon as possible, preferably at the RBS site. The next pages contain an example of a filled-in trouble report and a blank trouble report.

The trouble report should be sent to the nearest FSC (Field Support Center) for resolution and registration in the Ericsson trouble report system MHS (Modification Handling System). The FSC should forward the trouble report via the node MHO ERA BTS.

Special Explanations

Product number	The product number can be found on the label of the unit. Example: KRC 131 47/01.
R-state	Revision state, found on the label of the unit after the product number. Example: R1A.
Site status	Can be “Installation Test” or “Operation”

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Example of Filled-in Trouble Report

Trouble Report

Company: World-Wide Telecom	Date: 27 April 1995
Issued by: Jane Doe	Phone no: +01 419 555 1212
Address 501 Montgomery Avenue Mansfield, Ohio USA	Memo id: JDOE@WWT.OHIO.US
	Telefax no: +01 419 555 1212

Heading: TRXC (TRU) is reporting wrong fault code		
Product number or Document number: KRC 131 47/01		R-state R 1A
Site name: Hillfield, Ohio	Site id: EOA 043	Site status: Operation
Trouble symptoms: TRXC is reporting a fault code after CPU reset.		
Trouble Desciption: After you have pressed the CPU reset the TRU starts to send fault reports constantly. The code is: Internal Fault Class 1A fault no. 33 This fault code cannot be found in the fault list.		
Comments: The TRU fault indicator is not lit.		

03_0179A

Figure 257 Example of filled-in trouble report

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Trouble Report, Blank

Trouble Report

Company:	Date:
Issued by:	Phone no:
Address	Memo id:
	Telefax no:

Heading:		
Product number or Document number:		R-state
Site name:	Site id:	Site status:
Trouble symptoms:		
Trouble Desciption:		
Comments:		

02_0179A

Figure 258 Trouble report, blank

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12 Maintenance

12.1 Maintenance Process Overview

The purpose of this chapter is to give an overview of the maintenance process and to describe how to perform correct maintenance procedures.

12.1.1 How to use this chapter

Competence requirement

In order to do maintenance work according to this manual in a safe and professional way, the work shall be done by a skilled person.

The following qualifications are minimum requirements:

- Good understanding of radio and telephone engineering.
- Good understanding of engineering English.

Maintenance Process Overview

This section describes the maintenance process and how to perform correct maintenance procedures.

Maintenance General for RBS 2302/PBC

These sections contain general information as well as necessary information on how to operate the RBS and the PBC.

Fault Localization

This section contains information on how to identify the faulty unit(s). For supplementary information see:

OMT User's Manual *LZN 302 01*

Corrective Action — Maintenance for RBS 2302/PBC

These sections describe how to perform maintenance when faulty units have been found. For supplementary information the *chapters Site Installation Tests* and *Antenna System Tests* in this *User's Guide* are required.

Preventive Maintenance for RBS 2302/PBC

These sections contain procedures to increase the MTBF (Mean Time Between Failure).

To be able to perform maintenance, the field technician must be familiar with the product and the safety aspects that are involved.

1. Read *chapter Safety* in this *User's Guide.*
2. Read *sections Maintenance General* to become familiar with the product and how to operate it.

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3. When performing maintenance at site, evaluate the fault status with help from *section Fault Localization*.
4. Use *sections Corrective Action* in accordance with the information given in *section Fault Localization* to perform the maintenance procedures required.
5. Be sure to follow the instructions given in *section Concluding Routines* to finish the maintenance procedure.

Concluding Routines

The *section Concluding Routines* provides information on the different administrative routines that must be performed before leaving the site.

12.1.2 General

Note: The described units must not be opened at site. All maintenance that can be performed at site is described in this chapter.

The RBS 2302 is administrated and controlled by the Base Station Controller (BSC). There is an interface between the BSC and the Base Transceiver Station (BTS). The BSC has an overview of the status of the radio network and its resources.

12.1.3 Fault Handling Workflow

Steps one and two are automatically performed by the Base Station System (BSS). Step three is performed at the Operation and Maintenance Center (OMC) by an operator who handles the alarms of the Radio Base Station (RBS) with support from Operation Instructions (OPI). By analyzing the fault situation, the OMC operator will be able to take appropriate action. Step four is performed at the RBS site by a field technician who will follow the instructions in this manual.

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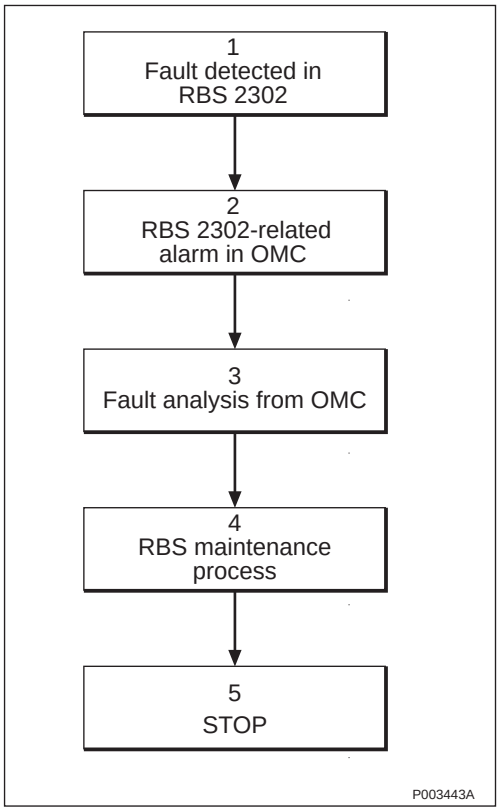

Figure 259 Fault handling workflow

12.1.4 Fault Analysis from OMC

This section describes, very briefly, a typical fault analysis process performed from an OMC. It describes procedures that must be performed before sending a field technician to the site.

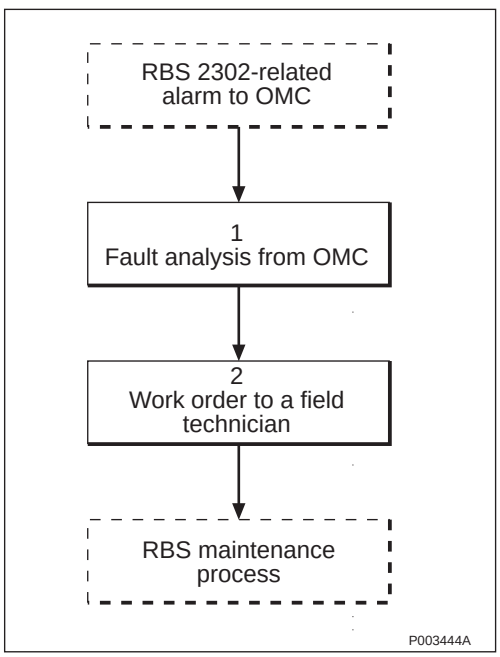

Figure 260 Fault analysis from OMC

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Fault analysis from OMC (1)

The fault codes received when acting on instructions in the BSC B-Module must be translated into fault information. This is described in the *chapter Fault Handling* in this binder.

Work order to a field technician (2)

Before writing the work order, the following questions must be taken into consideration to optimize the visit at the site:

- Is preventive maintenance scheduled at this site in the near future?
- Are there any other faults that have been reported at this site that have been postponed?
- Are there any other reasons for sending a field technician to the site?

The work order must include information about the following:

- Site location.
- How to get to the site.
- Special tools or equipment needed.
- RBS identity.
- The suspected unit.
- Site history

The field technician will now take care of maintenance at the site. When the work is completed, a report will be written.

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12.1.5 RBS 2302 Maintenance Process

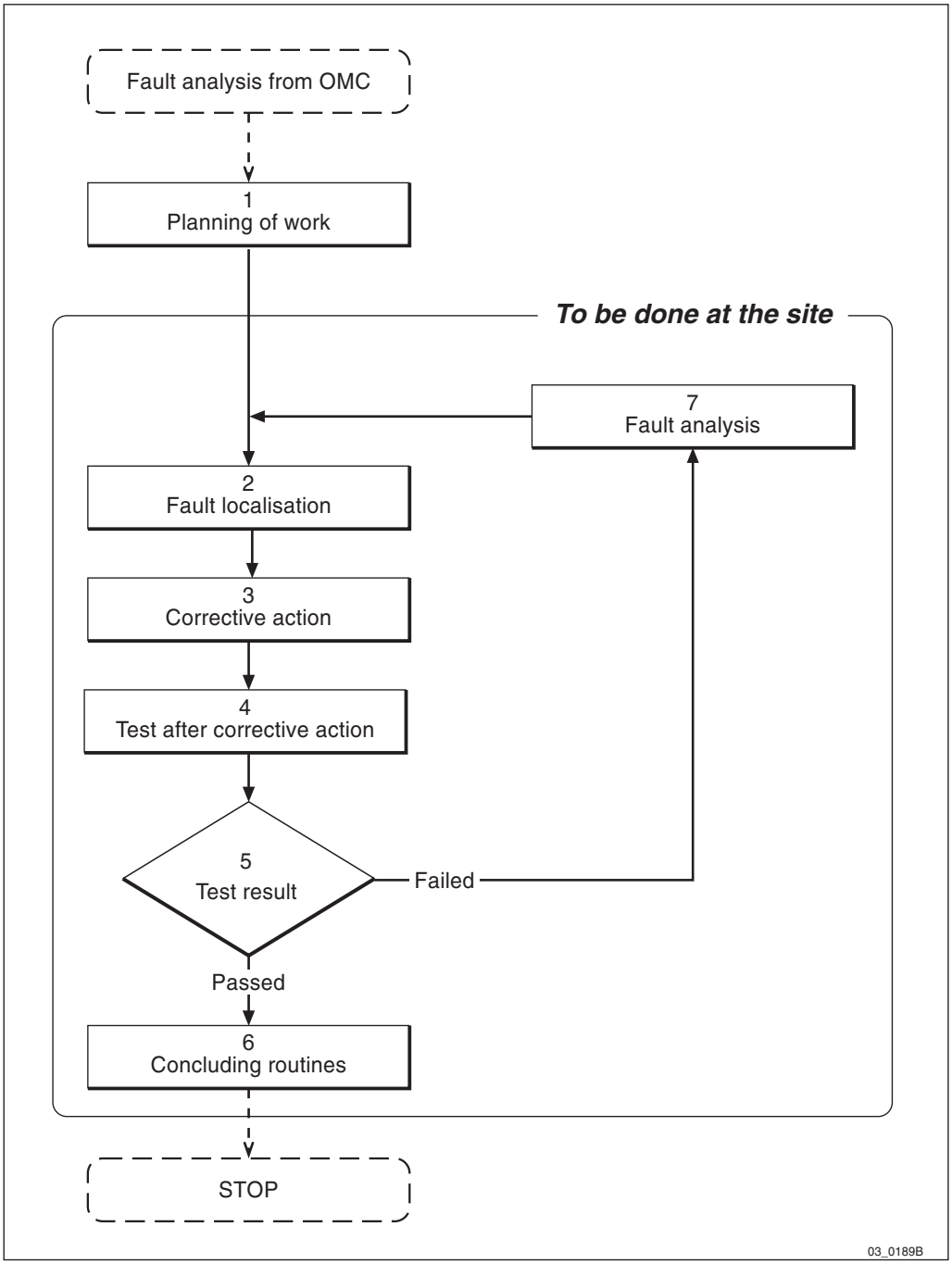

Figure 261 Maintenance process

Planning of work (1)

As a result of the fault analysis, a work order has been written. The work order will include information about site location, how to get to the site, special tools and equipment needed, RBS identity, the

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suspected unit, and site history. An error log will also be included if the fault is defined as logical.

CAUTION

Read through the *chapter Safety* to ensure knowledge of potential risks prior to beginning work on the RBS equipment.

The work order should be analyzed before personnel are sent to the site. This is done in order to:

- Select the spare parts and tools required at the RBS site.
- Inform the OMC operator if the site visit will reduce RBS functionality.

Fault localization (2)

The *section Fault Localisation* provides mapping from fault information to a faulty unit.

Corrective action (3)

The *section Corrective Action* describes how to replace a faulty unit.

Test after corrective action (4)

The subsection *Test after corrective action* describes how to verify that the functionality of the radio cabinet is correct, with the help of *chapter Site Installation Tests*.

Test result (5)

If the test has failed, it will be necessary to perform a fault analysis. Otherwise, continue with *Concluding routines (6)*.

Concluding routines (6)

The *section Concluding Routines* provides information on the different administrative routines that must be performed before leaving the site.

Fault analysis (7)

Use the OMT to read fault status and translate the information received according to the Fault Code List. If the fault analysis fails to give more fault information, contact the supervisor or manager who will take further action, for example, such as contacting the FSC.

12.1.6 Fault Cases and External Alarms

Faults are indicated with LEDs, a display on the PBC and a RU map.

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External Alarms

External alarms are customer defined. The alarm detector activates the alarm by an open or closed alarm sensor loop. It is possible to define and change the setup for each alarm by means of the OMT (Operations and Maintenance Terminal). The setup is stored in the IDB (Installation Data Base) in the RBS.

The yellow indicator marked “External alarm” on the Distribution Panel (DP) will light up if any external alarms are activated. When an external alarm is activated, the OMT must be used for examining the alarm status and the alarm setup.

RBS 2302 has eight (8) external alarm inputs.

RBS 2302 with optional PBC has seven (7) external alarm inputs available. One alarm input is required for the power surveillance of the PBC.

12.2 Maintenance General for RBS 2302

This chapter contains essential information regarding the user interface of the RBS, changing the RBS from Remote to Local Mode, and Shut down and Start up procedures.

12.2.1 Introduction

The purpose of this chapter is to familiarize the user with the RBS. The location of the Interface is shown, and an explanation on how to read the alarms is supplied.

12.2.2 Location of the RBS User Interface

The RBS user interface, including optical indicators, power switches and control buttons, is located behind the installation box door.

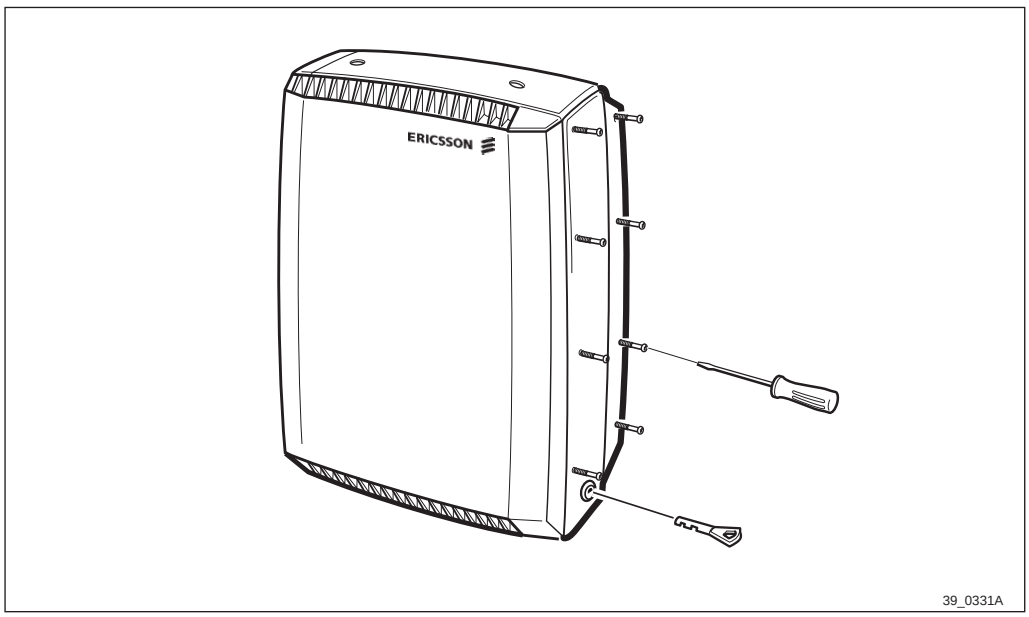

Figure 262 Sealing screws and key for the installation box door

To open the door: loosen the sealing screws and unlock with the key.

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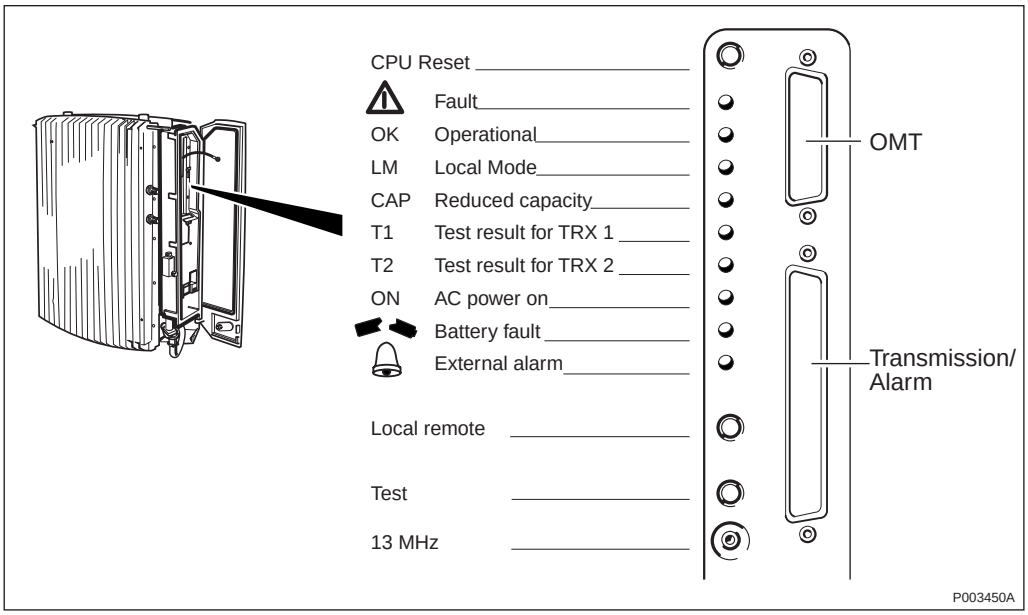

Figure 263 RBS user interface

12.2.3 Optical Indicators

The purpose of the optical indicators is to provide a fast way of indicating the operational status of the included equipment.

The general principles are:

Red:	A fault is located, check with OMT.
Yellow:	Operational (Local Mode, AC Power on).
	Faulty (Battery Fault, External Alarms, Reduced Capacity).
Green:	Operational.
Flashing indicators:	Wait, activity in progress.

The optical indicators shows that a fault/faults have been detected, and the OMT should thereafter be used for more advanced fault localization.

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Explanation of the Indicators

Indicator	Mode	Description
Fault	**Generally:**	
(Red)	OFF	No fault(s) detected.
	ON	Fault(s) detected.
Fault	**2 TRX Sector Configuration:**	
(Red)	FLASHING	One of the following reasons: • IDB Database is missing, or wrongly configured. • Running on Base Application. • ARAE fault (BSS R7 or later). • Battery fault.
Fault (1)	**4 TRX / 6 TRX Configuration:**	
(Red)	FLASHING (Master or Extension cabinet)	One of the following reasons: • IDB Database is missing, or wrongly configured. • Fault(s) detected in Extension cabinet(s). • Running on Base Application. • ARAE fault (BSS R7 or later). • Battery fault.
	ON (Extension cabinet) and FLASHING (Master cabinet)	• SW/HW fault in Extension cabinet and/or Master cabinet.
Operational(1) (Green)	OFF	Not operational, or change Local/Remote mode in progress.
	ON	When in local mode: • Operational, but not in traffic. When in remote mode: • Connected to BSC and considered operational by the BSC.
	FLASHING	One of the following reasons: • Receiving application software. Restart pending. • Configuration in progress (this may take more than 10 seconds to complete).

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Indicator	Mode	Description
Local mode [1] (Yellow)	OFF	The RBS is in remote mode.
	ON	The RBS is in local mode.
	FLASHING	Change of mode in progress.
Reduced Capacity [1] (Yellow)	OFF	All TRXs are operational.
	ON	At least one TRX is not operational.
T1 Test result for TRX 1		Not used
T2 Test result for TRX 2		Not used
AC Power On[1] (Yellow)	OFF	AC power not available.
	ON	AC power available.
Battery Fault[1] (Yellow)	OFF	Battery connected.
	ON	Battery disconnected or faulty. Low battery DC voltage.
External Alarms[1] (Yellow)	OFF	No external alarm(s) active.
	ON	External alarm(s) active.
	ON (Extension cabinet) and FLASHING (Master cabinet)	External alarm on Extension cabinet(s).

[1] Indicated on all cabinets.

12.2.4 Switches and Connectors

Switches

Switch	Function
CPU reset button [1]	Reset of the RBS
Local remote button [1]	Change between Local/Remote mode
Test	Not used

[1] Configuration 4 TRX or 6 TRX: CPU reset and change of mode can be performed on both Master and Extension cabinet(s).

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Connectors

Connector	Function
OMT [1]	Connector for the OMT cable
13 MHz	Connector for RF measurements and calibration

[1] Configuration 4 TRX or 6 TRX: all cabinets are controlled by the OMT connector on the Master cabinet.

12.2.5 Changing the RBS Local/Remote Mode

The Local/Remote button can change a RBS mode to local or remote control. The Local/Remote button is located on the Distribution Panel (DP), *see Figure 264 on page 319*. An RBS in Local Mode cannot communicate with the BSC via the PCM-line and is therefore isolated from the BSC.

The Local/Remote button is used to isolate the unit from the BSC, for example, when exchanging faulty units.

An RBS cannot be changed to Remote Mode until the database has been downloaded to the Distribution Switch Board (DXB). See:

OMT User's Manual *LZN 302 01*

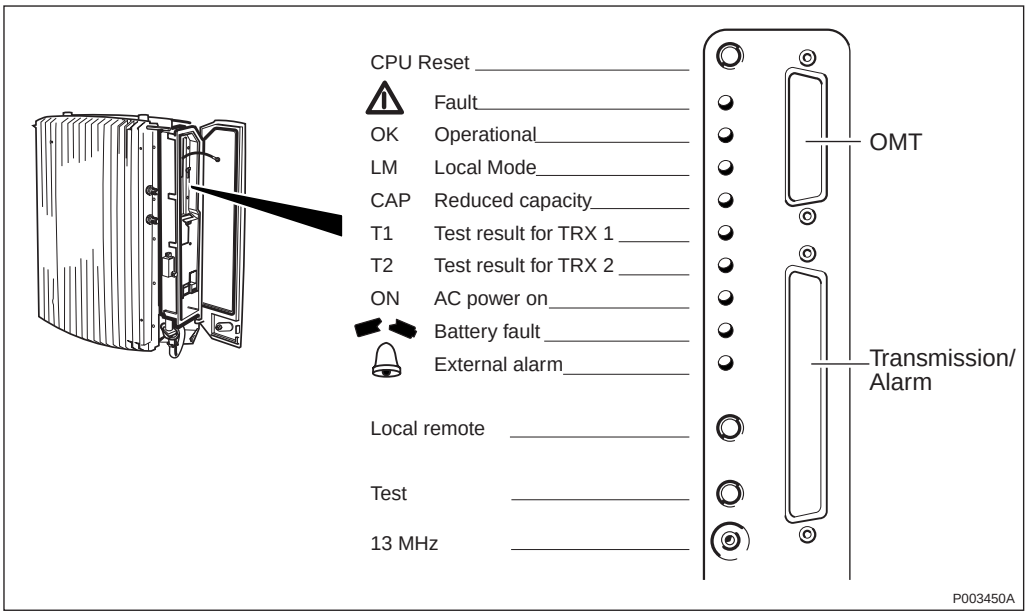

Figure 264 Distribution Panel

Changing the RBS from Remote to Local Mode

Note: The Local Mode indicator must be in mode OFF before any action is done.

1. Press the Local/Remote button.

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2. The Local Mode indicator starts flashing to indicate that a change of RBS mode is in progress.
3. The Operational indicator turns off to indicate that the RBS has been taken out of operation.
4. A fault report message is sent to the BSC via the PCM-line. This means that an external condition class 1 alarm will be raised in the BSC.
5. The communication link on the PCM-line is disconnected and the RBS mode is changed to Local Mode.
6. The Local Mode indicator turns on. The Operational indicator is also turned on if the RBS is free from class 1 faults, in order to indicate that the radio cabinet is in local operation.

Changing the RBS from Local to Remote Mode

Note: The Local Mode indicator must be in mode ON before any action is done.

1. Press the Local/Remote button.
2. The Local Mode indicator starts flashing to indicate that a change of RBS mode to Remote is in progress.
3. The communication link on the PCM-line is established by an order from the BSC. The RBS is changed to Remote Mode immediately after the link towards the BSC has been established.
4. The Local Mode indicator turns off.
5. To indicate that the RBS is ready to carry traffic the Operational indicator turns on.

Note: This will only happen if the RBS is considered operational by the BSC.

Aborting changing from Local to Remote Mode for the RBS

If the Local/Remote button is pushed while the Local Mode indicator is flashing, the change of RBS mode to Remote is interrupted.

Note: This function is only valid during a change of RBS mode to Remote.

1. Press the Local/Remote button.
2. The attempt to enable a connection with the BSC will stop.
3. The RBS will then remain in Local Mode with the communication link disconnected and the Local Mode indicator on.

12.2.6 Shut down Sequence

This is the shut down sequence for RBS 2302.

1. Set the RBS to Local Mode.

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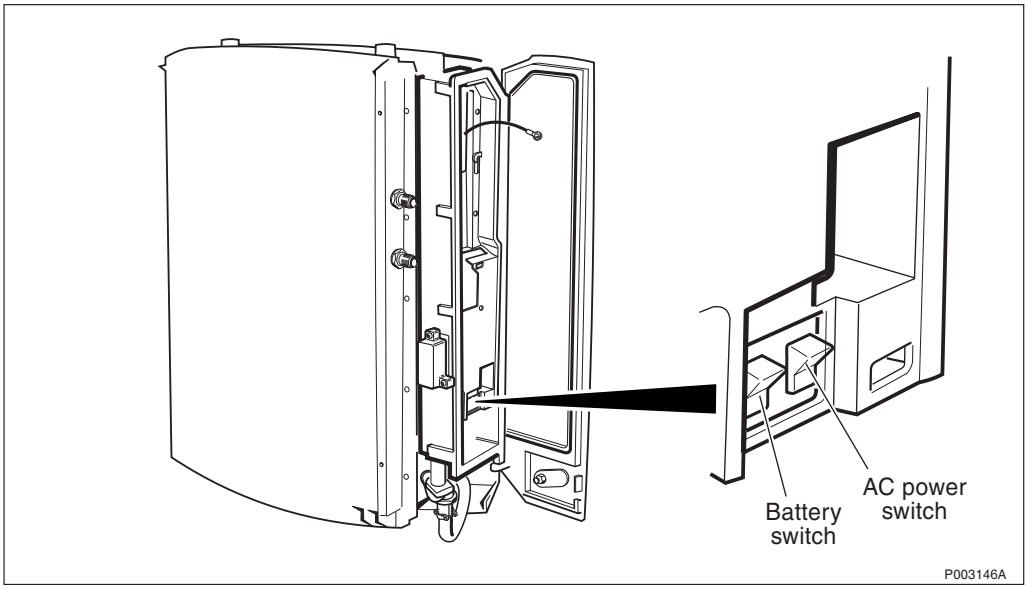

Figure 265 Battery and AC power switch in the RBS

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

Note: When the AC power supply is turned off with the AC power switch in the RBS, there is still AC voltage both on the AC board in the interface box, and on the connection board in the installation box up to the power switch.

2. Switch the RBS Battery switch to the OFF position.
3. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 6 on page 323*.

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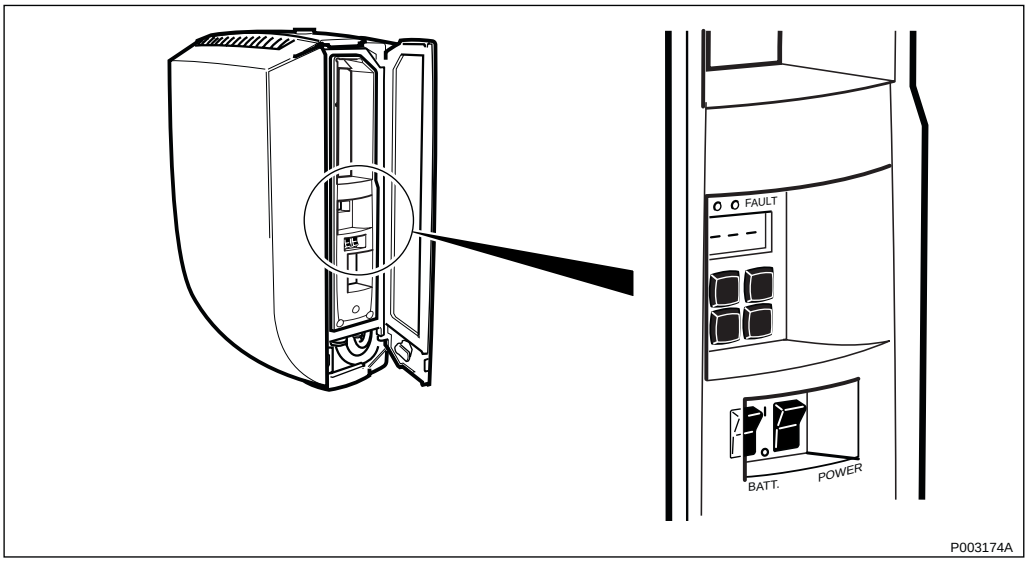

Figure 266 Battery and AC switch in the PBC

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

Note: When the AC power supply is turned off with the AC power switch in the PBC, there is still AC voltage both on the AC board in the interface box, and on the EMC board in the installation box up to the power switch.

4. Switch the PBC Battery switch to the OFF position.
5. Switch the PBC AC switch to the OFF position.

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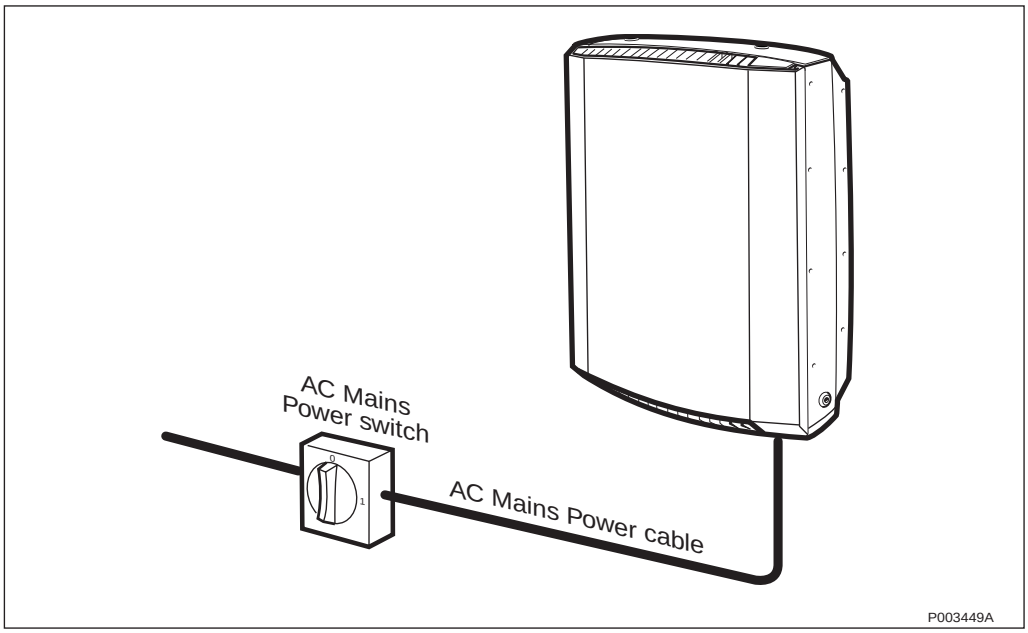

Figure 267 AC mains power switch turned off

Note: When, according to the manual, the AC Mains Power switch is to be turned off, it is very important that *all* radio cabinets and *all* battery cabinets are switched off.

6. Switch off the AC Mains Power switch.

Note: Wait at least 20 seconds before performing any work on the AC Board, so that the capacitors have sufficient time to discharge.

12.2.7 Start up Sequence

This is the start up sequence for the RBS 2302.

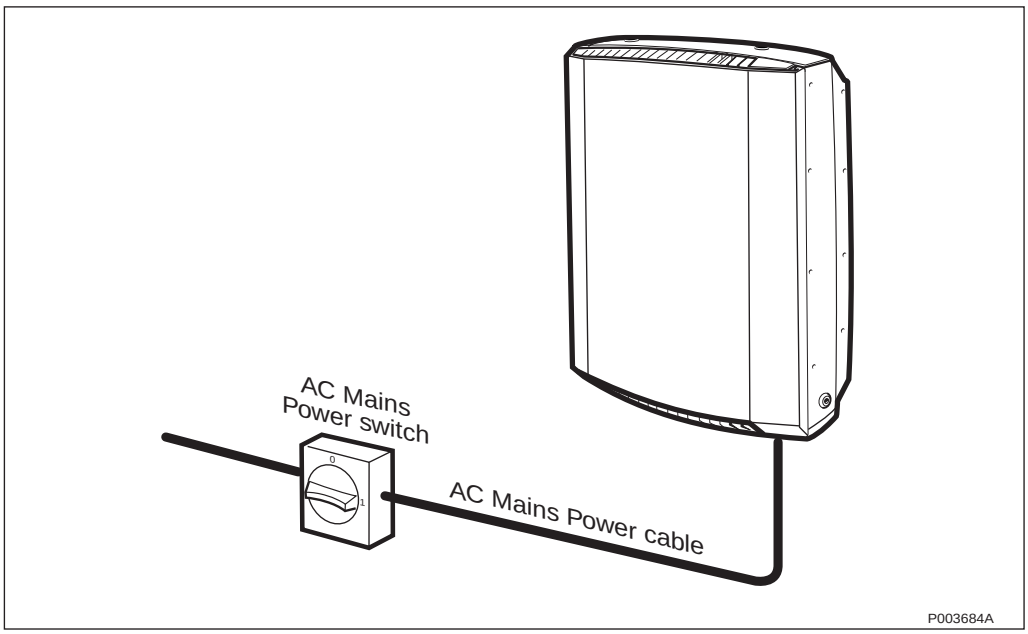

Figure 268 AC mains power switch turned on

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1. Turn the AC Mains Power switch to the ON position.

Note: Switch on *all* radio cabinets and *all* battery cabinets.

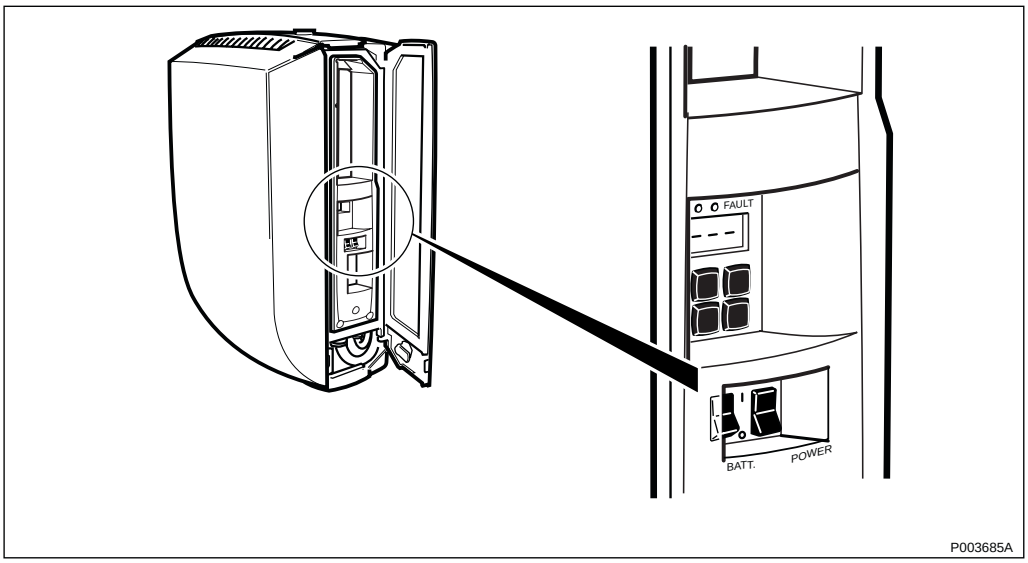

Figure 269 Battery and AC switch in the PBC

2. Switch the PBC AC switch to the ON position.
3. Switch the PBC Battery switch to the ON position.

If the PBC is not used, proceed to *step 4 on page 324*.

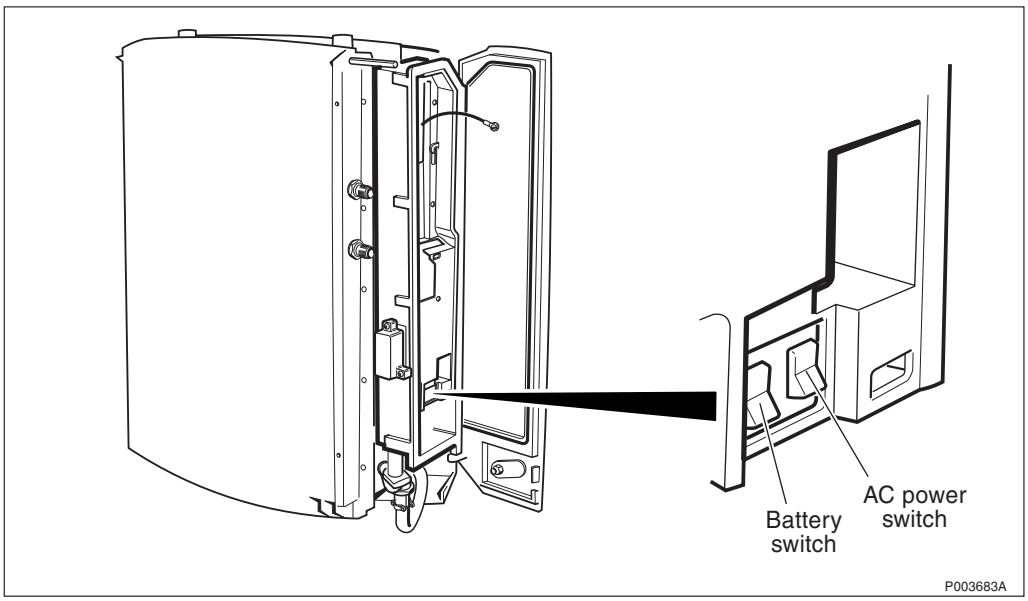

Figure 270 Battery and AC power switch

4. Switch the AC power switch on the RBS to the ON position.
5. Switch the Battery power switch on the RBS to the ON position.
6. Set the RBS to Remote Mode.

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12.2.8 Tightening Torques for RBS 2302

When replacing units, tighten screws/nuts according to table below. Exceptions are printed circuits boards and plastic covers inside installation boxes and interface boxes. These screws must be tightened with a reduced torque.

Table 52 Recommended Torque

Dimension	Torque				Notes
	Ncm	Nm	lbf-in	lbf-ft	
M3	110 +/- 7	-	9.7 +/- 0.6	-	
M3	80 +/- 7	-	7.1 +/- 0.6	-	Reduced for PCBs and plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	190 +/- 15	-	16.8 +/- 1.3	-	Reduced for PCBs and plastic covers
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	

12.2.9 Cable connections overview for RBS 2302

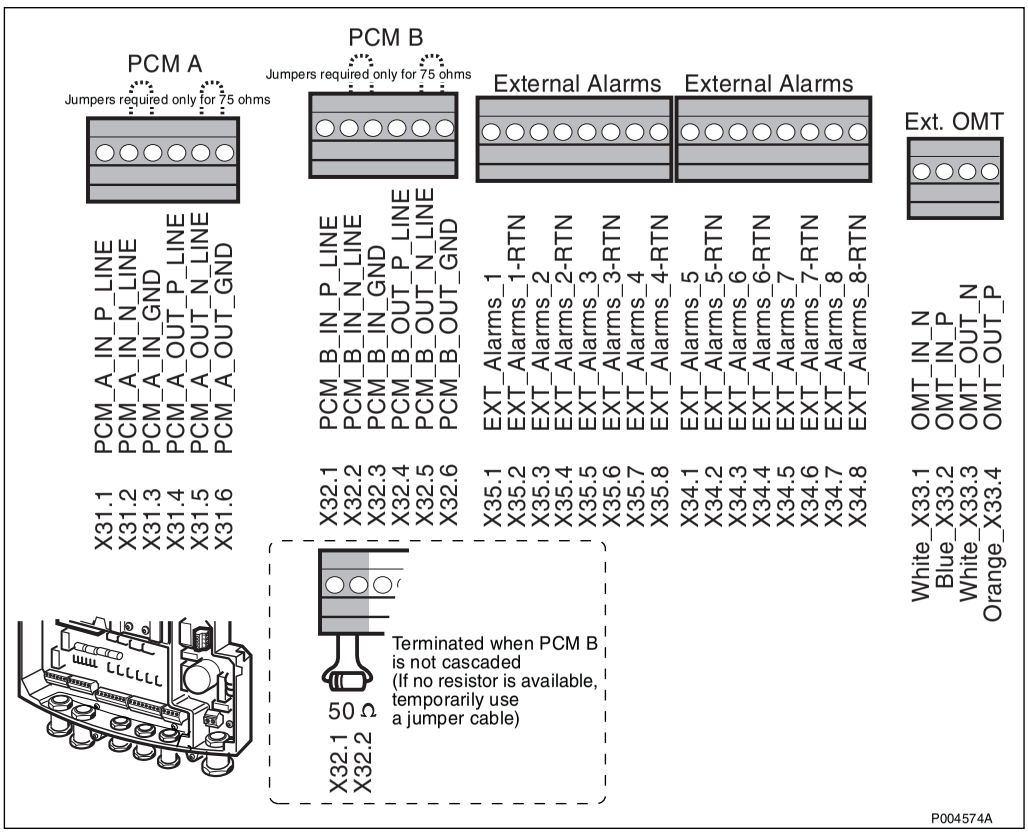

Figure 271 Cable connections for RBS 2302

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Note: These schematics show all possible connections including the options, depending on the configuration at the site.

12.3 Maintenance General for the PBC

This chapter contains essential information regarding the user interface of the PBC, Shut down and Start up procedures.

12.3.1 Introduction

The purpose of this chapter is to familiarize the user with the Power and Battery Cabinet (PBC). The location of the Interface is shown, and an explanation is given on how to read the alarms and executed command on the PBC display supplied.

12.3.2 Location of the PBC User Interface

The PBC user interface, including optical indicators, power switches and control buttons, is located behind the installation box door.

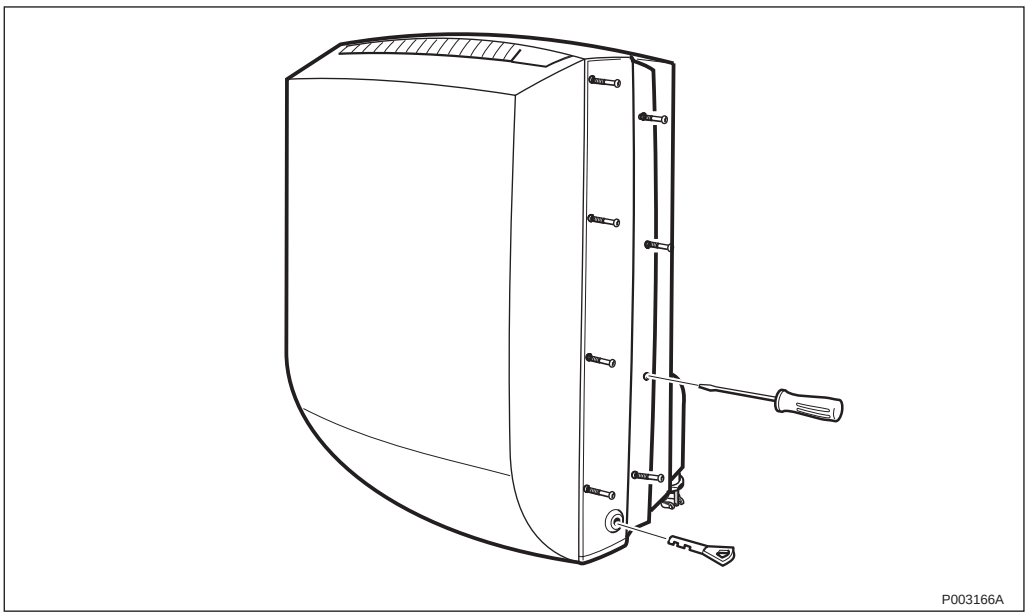

Figure 272 Sealing screws and key for the installation box door

To open the door: loosen the screws and unlock with the key.

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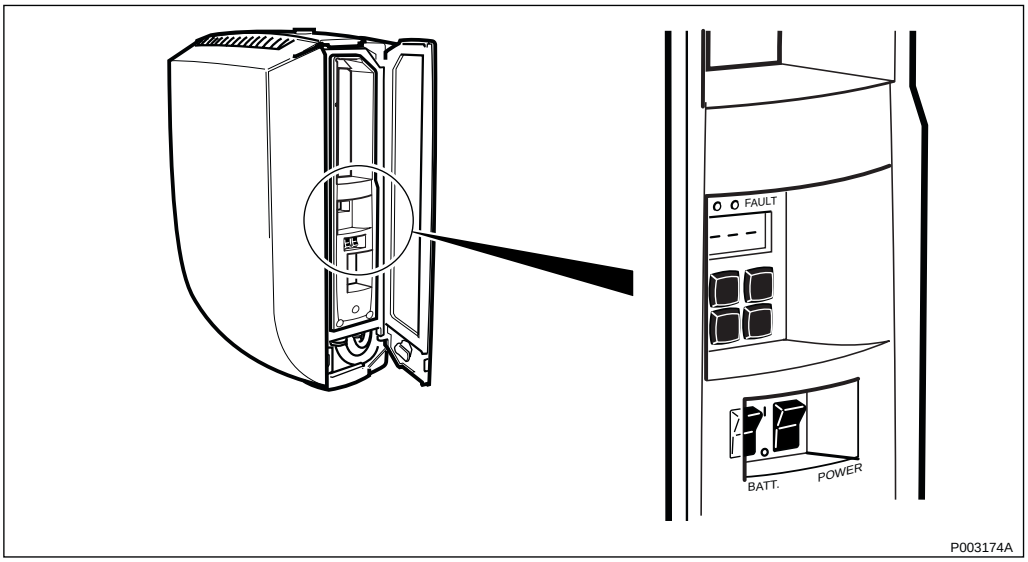

Figure 273 Location of the control panel in the PBC

12.3.3 Control Panel

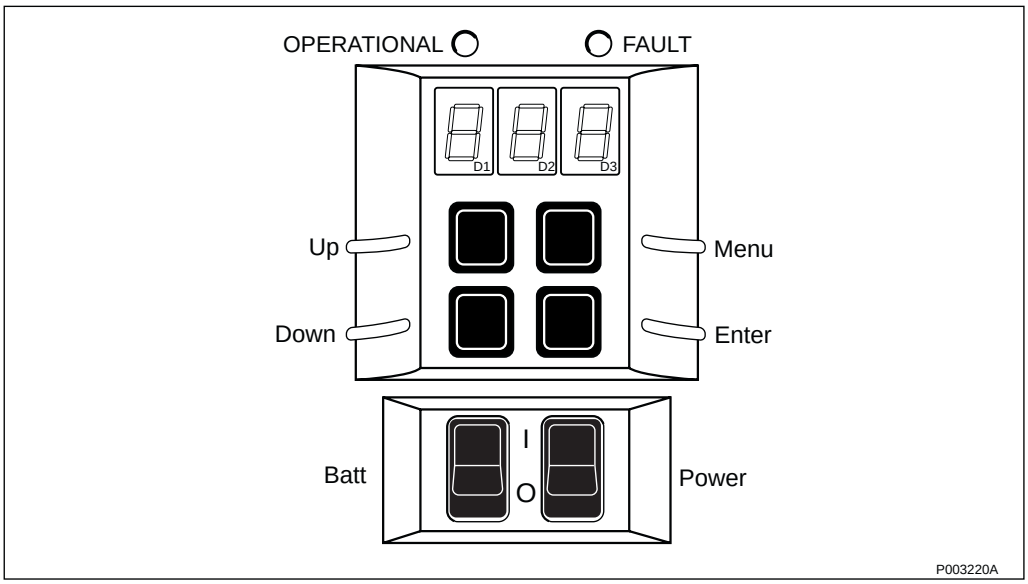

Figure 274 PBC control panel

Optical Indicators

The LED indicators give the following information on the current system status, valid for the PBC alarms:

Table 53 Explanation of the LED indicators

Operational (Green)	Fault (Red)	Classification
ON	OFF	OK
OFF	ON	SEVERE
ON	ON	WARNING, POWER

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Alarm Display

The alarms are shown as fault codes on the display. The display is divided into three display elements:

Element 1 (D1)	Unit number. The unit number is used to identify the faulty unit. 0 = PBC (Unit numbers 1 - 9 are not used for RBS 2302)
Element 2 (D2)	Alarm class. The alarm is classified according to the degree of severity. There are two Classified alarms, and one Not classified: 0 = Not classified (used for historical alarms) 1 = Severe 2 = Warning
Element 3 (D3)	Fault code from the PBC. *See Table 56 on page 330* or Command that will be executed. *See Table 57 on page 331*.

Control Buttons

The control buttons on the display panel are used for:

– stepping through fault codes.

– selecting commands.

Table 54 Control buttons on the display panel

Control button	Action
Up	Digit step up
Down	Digit step down
Menu	Activates command selection
Enter	Executes commands

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Fault Messages

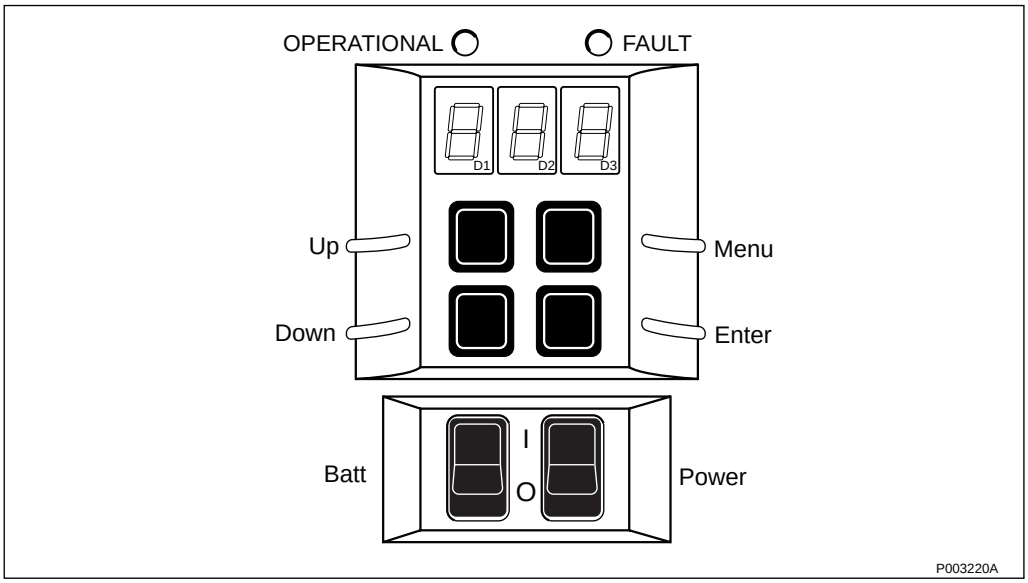

Figure 275 Display view if no faults are detected

- If there are no faults, this is indicated on the alarm display as shown in *Figure 275 on page 329*.
- If a fault occurs, the relevant fault code is automatically displayed, *see Section 12.3.7 on page 330*.
- To detect if there are several faults, step through the fault codes using the push buttons Up and Down, *see Table 54 on page 328*.

Except for temperature alarms, all alarm codes originate from present faults, that is, no fault history is displayed.

12.3.4 Supervision of the PBC

The Power and Battery Cabinet (PBC) alarms supervise:

- Main input AC power
- AC/DC converter
- DC/DC converter
- Battery unit
- Cabinet temperatures

Power up

When the power is switched on, the PBC display starts flashing. The power up takes about 5 seconds, then the active system status appears on the display.

12.3.5 PBC originated Alarms to the RBS

All alarms transmitted to RBS are active alarms.

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Alarm terminals on the PBC

The PBC has eight terminals for PBC alarms. Four of these are outgoing, used to connect the RBS. The remaining four terminals enable connection of incoming alarms from a second PBC.

Alarm connected to the RBS

The PBC alarm is connected to an RBS external alarm input, and generates the following alarm:

Alarm	Unit
POWER, WARNING	PBC

Note: The external alarm inputs on the RBS must be defined accordingly at installation, *see chapter Site Installation Tests*.

12.3.6 Stand Alone Mode

The PBC must be in Stand Alone mode, as no active antenna is used. To set the PBC in Stand Alone mode, *see Section 12.3.8 Commands on page 331*.

12.3.7 Fault Codes

Table 55 Alarm classes on display element D2

Code	Alarm class
0	Not classified
1	Severe
2	Warning

Table 56 Fault codes on display element D3

Code	Fault
0	AC fault (no mains)
1	AC/DC fault
2	DC/DC overload
3	DC/DC fault
4	Battery fault
5	Battery disconnected
6	Battery voltage low
7	Overtemp active
8	Overtemp historical
9	PBC in standalone mode, antenna detected

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12.3.8 Commands

Table 57 on page 331 lists the command codes used for RBS 2302. Other codes are used for Maxite.

Table 57 Command codes on display element D3

Code	Command
5	Clear historical temperature alarms
6	Set PBC in stand alone mode
7	Exit PBC from stand alone mode

Clear Historical Temperature Alarms

There are two kinds of temperature alarms: active and historical.

Alarm code 0 0 8 on the display indicates "PBC Alarm, Overtemperature historical".

To reset the historical alarm:

1. Press Menu.
2. Select code 5 on display element D3 with the Up or Down button.
3. Press Enter. The command is executed.

Setting the PBC in Stand Alone Mode

Note: Always set the PBC in Stand Alone mode when active antenna is not used.

1. Press Menu.
2. Select code 6 on display element D3 with the Up or Down button.
3. Press Enter. The command is executed.

12.3.9 Shut down Sequence

This is the shut down sequence for RBS 2302. Parts of the sequence are also applicable to the PBC.

1. Set the RBS to Local Mode.

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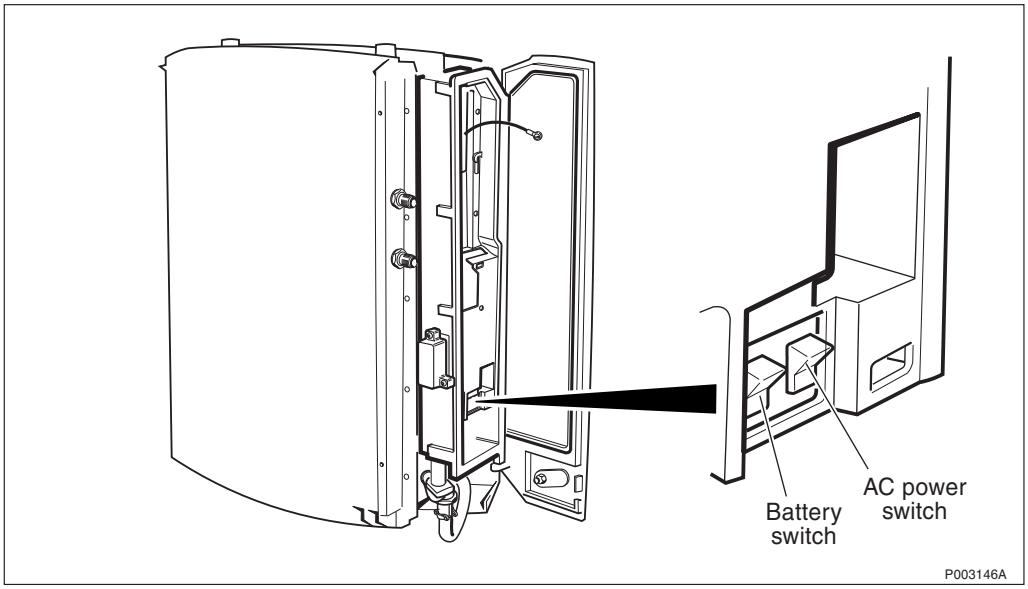

Figure 276 Battery and AC power switch in the RBS

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

Note: When the AC power supply is turned off with the AC power switch in the RBS, there is still AC voltage both on the AC board in the interface box, and on the connection board in the installation box up to the power switch.

2. Switch the RBS Battery switch to the OFF position.
3. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 6 on page 334*.

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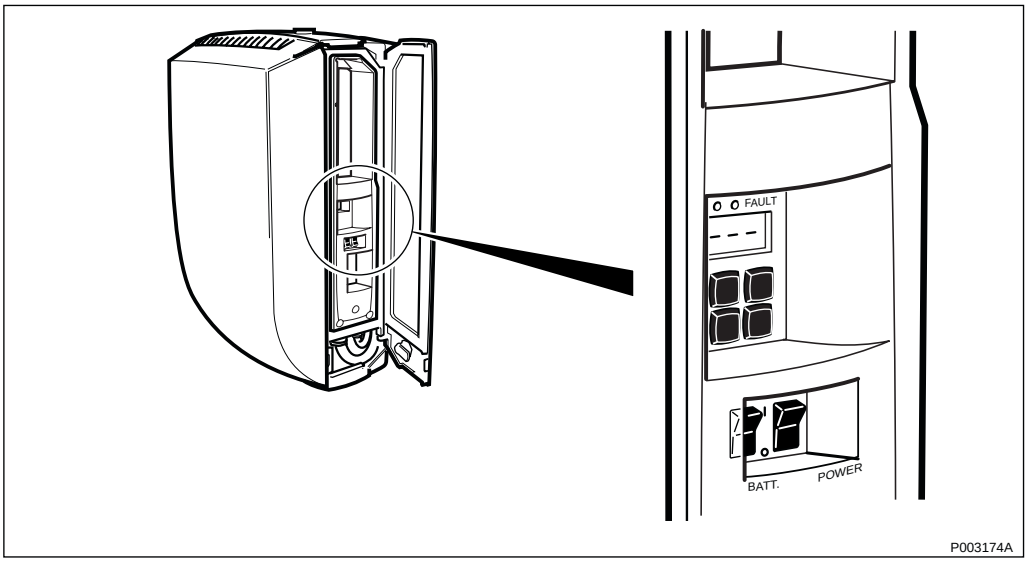

Figure 277 Battery and AC switch in the PBC

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp items or moisture can be fatal.

Note: When the AC power supply is turned off with the AC power switch in the PBC, there is still AC voltage both on the AC board in the interface box, and on the EMC board in the installation box up to the power switch.

4. Switch the PBC Battery switch to the OFF position.
5. Switch the PBC AC switch to the OFF position.

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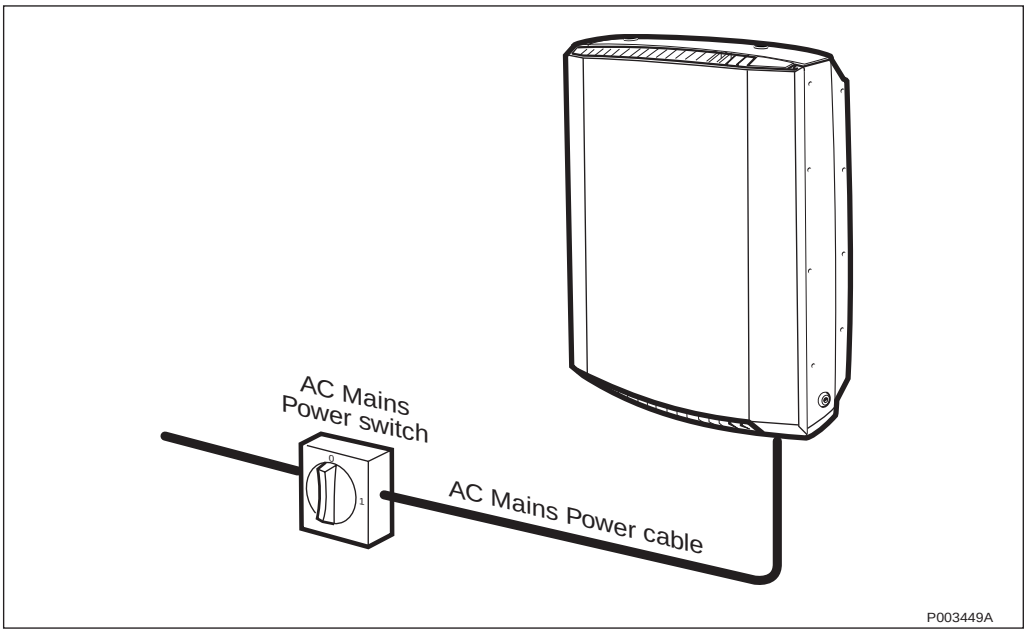

Figure 278 AC mains power switch turned off

Note: When, according to the manual, the AC Mains Power switch is to be turned off, it is very important that *all* radio cabinets and *all* battery cabinets are switched off.

6. Switch off the AC Mains Power switch. If a PBC is used, it should also be switched off.

Note: Wait at least 20 seconds before performing any work on the AC Board, so that the capacitors have sufficient time to discharge.

12.3.10 Start up Sequence

This is the start up sequence for the RBS 2302. Parts of the sequence are also applicable for the PBC.

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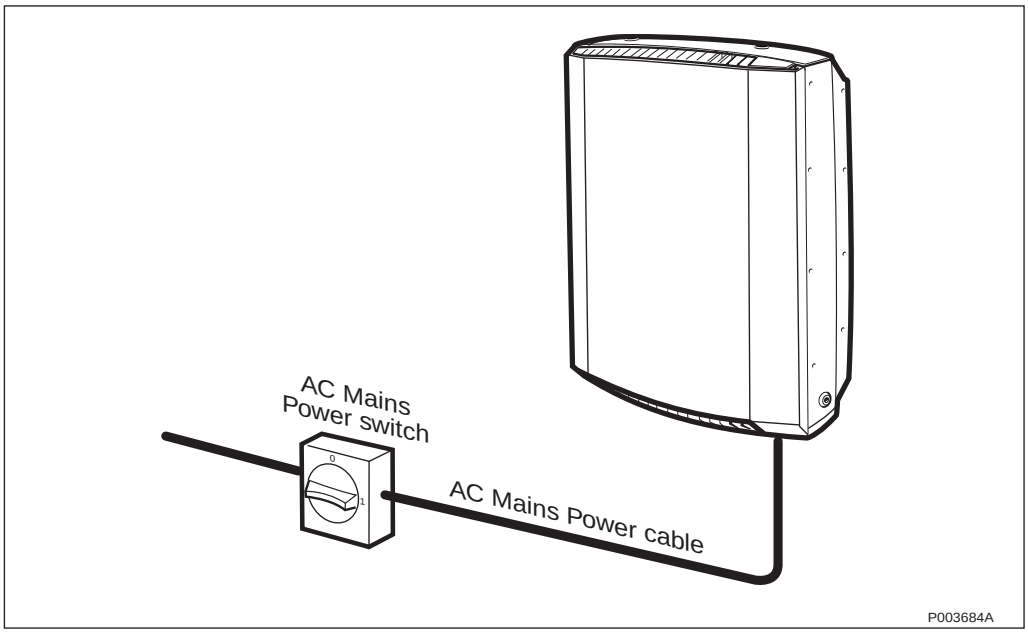

Figure 279 AC mains power switch turned on

1. Turn the AC Mains Power switch to the ON position.

Note: Switch on *all* radio cabinets and *all* battery cabinets.

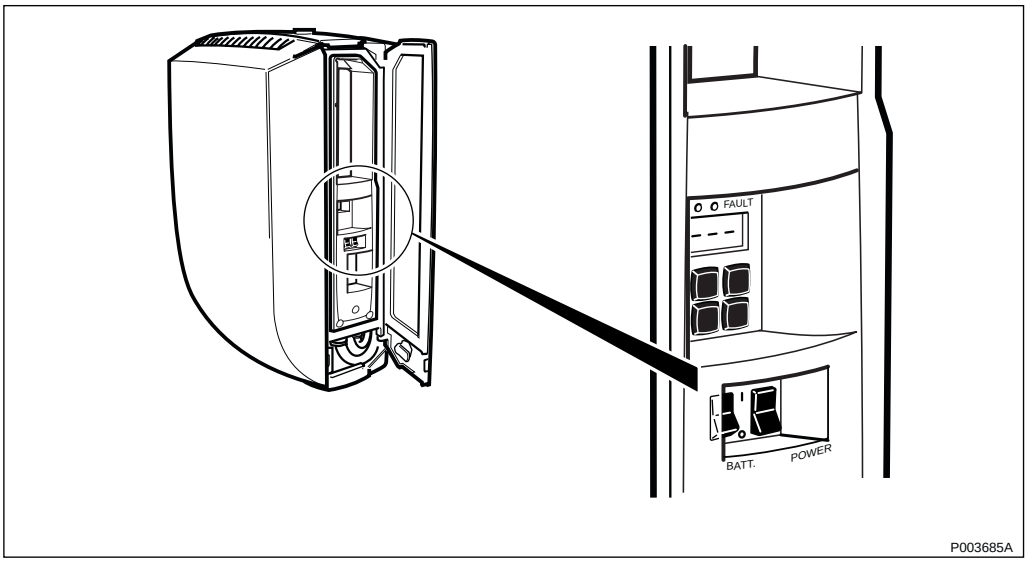

Figure 280 Battery and AC switch in the PBC

2. Switch the PBC AC switch to the ON position.
3. Switch the PBC Battery switch to the ON position.

If the PBC is not used, proceed to *step 4 on page 336*.

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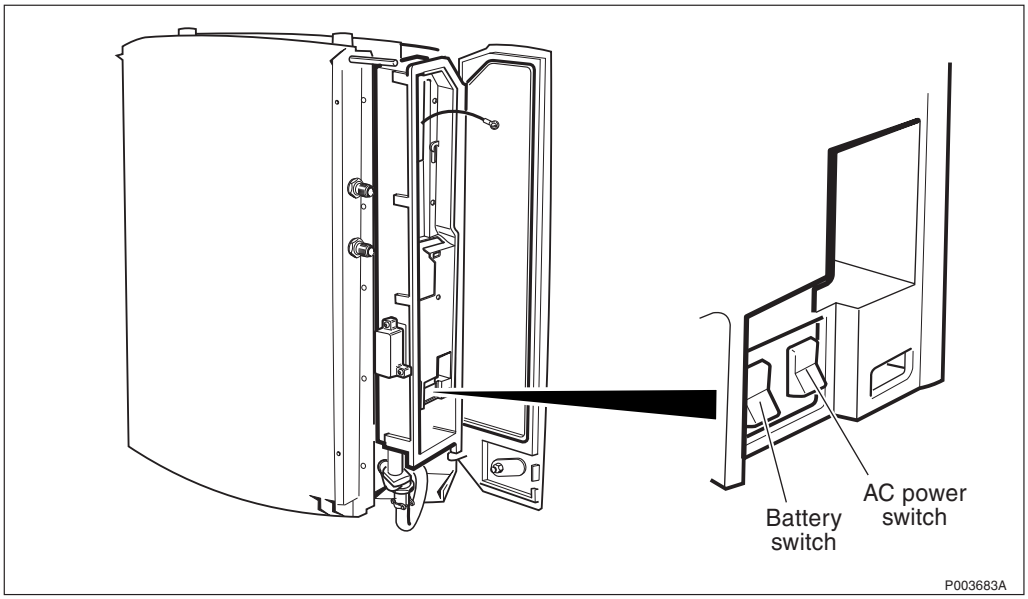

Figure 281 Battery and AC power switch

4. Switch the AC power switch on the RBS to the ON position.
5. Switch the Battery power switch on the RBS to the ON position.
6. Set the RBS to Remote Mode.

12.3.11 Tightening Torques for the PBC

When replacing units, tighten screws/nuts according to table below. Exceptions are printed circuits boards and plastic covers inside installation boxes and interface boxes. These screws must be tightened with a reduced torque.

Table 58 Recommended Torque

Dimension	**Torque**				**Notes**
	Ncm	Nm	lbf-in	lbf-ft	
M3	110 +/- 7	-	9.7 +/- 0.6	-	
M3	80 +/- 7	-	7.1 +/- 0.6	-	Reduced for PCBs and plastic covers
M4	260+/- 15	-	23.1 +/- 1.3	-	
M4	190 +/- 15	-	16.8 +/- 1.3	-	Reduced for PCBs and plastic covers
M5	540 +/- 30	-	47.8 +/- 2.6	-	Battery poles for battery cabinet
M6	-	8.8 +/- 0.5	-	6.5 +/- 0.4	
M8	-	21 +/- 1.3	-	15.5 +/- 1	
M10	-	41 +/- 2.5	-	30.2 +/- 1.8	

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12.3.12 Cable connections overview for the PBC

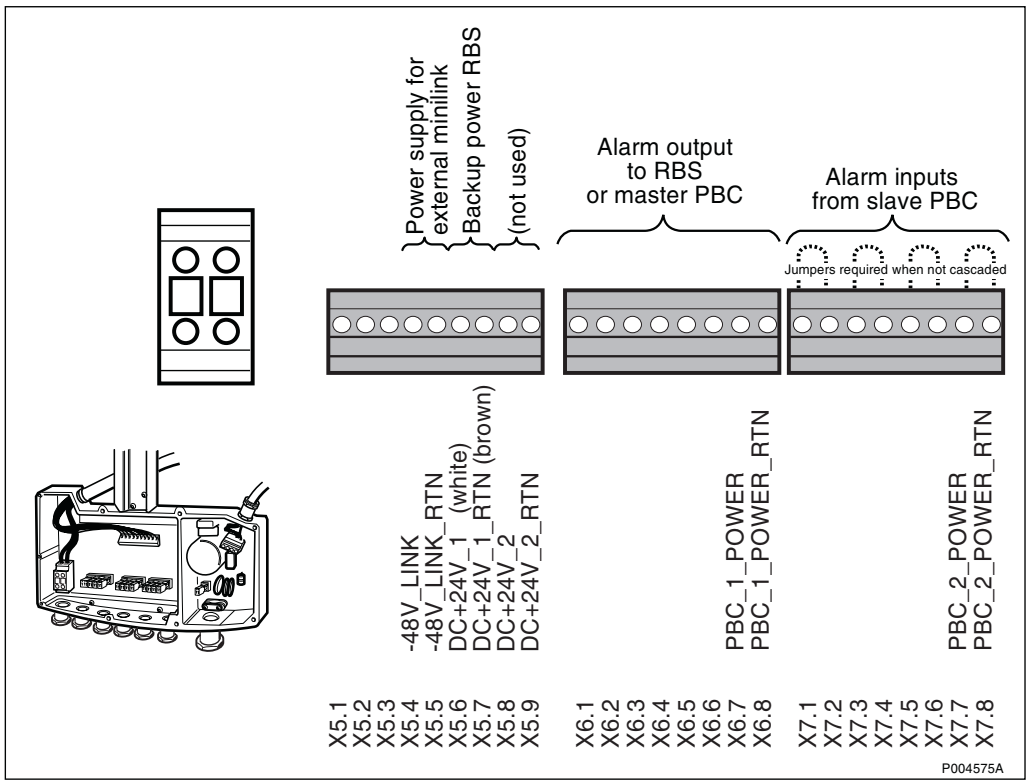

Figure 282 Cable connections for PBC

Note: These schematics show all possible connections including the options, depending on the configuration at the site.

12.4 Fault Localization

This section provides information about the fault codes indicated by the units, and the procedures to find the faulty unit(s).

- Use the Optical Indicators fault code list to identify the indications on the unit(s).
- Use the fault localization procedures to trace the fault when the unit is not pinpointed.
- The 32 bit version of the OMT can be used to acquire more information, or when more than one fault is present.

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12.4.1 Fault Tracing Guidelines for RBS 2302

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

Table 59

Fault (lit)	**If the red LED is lit, two causes are possible. Use OMT to display the faults.** 1/ The cabinet is faulty: Replace it. (2 TRX configuration). 2/ If the cabinet is configured as a master in a 4 or 6 TRX configuration the communication is lost to the extension cabinet(s). Check the TXL cable and the extension cabinets.
Fault (flashing)	**If the red LED is flashing, four causes are possible. Use OMT to display the faults.** 1/ The IDB is missing or corrupted: Install a new IDB according to the *OMT User's Manual* [(1)]. 2/ BTS software is missing and the RBS is running on base application. The BSC is currently reloading the BTS software. 3/ Lost communication in the RBS: Replace the cabinet. (2 TRX configuration). 4/ If the cabinet is configured as a master in a 4 or 6 TRX configuration, communication is lost to extension cabinets or faults are detected in one or both extension cabinets. Check the TXL cable and extension cabinets.
Reduced capacity	**If the yellow LED is lit, the radio cabinet is faulty. Replace it.**

(1) See:

OMT User's Manual *LZN 302 01*

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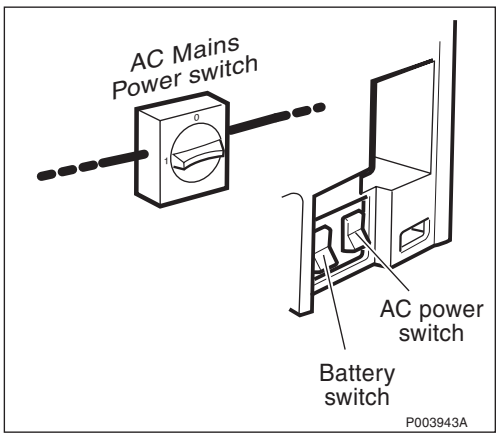
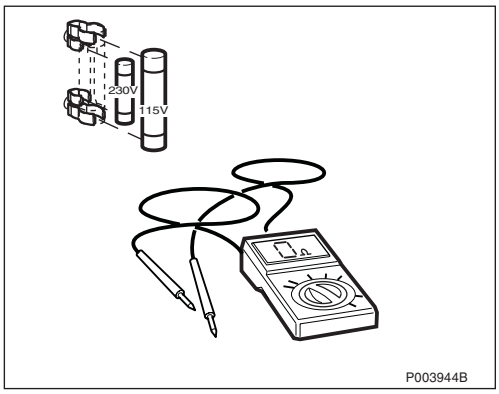
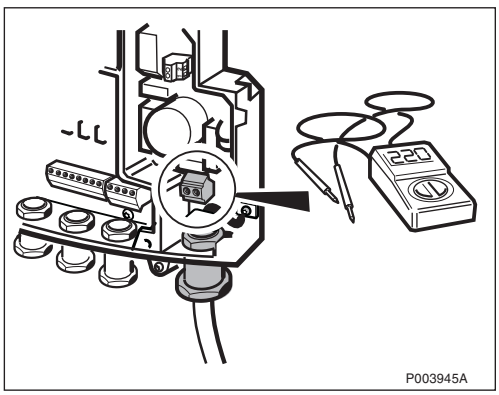
Table 60

AC Power ON	If the yellow LED is *not* lit, 115/230 V is *not* present in the radio cabinet.
	 Confirm that the main switch is in the ON position and that the AC switch on the RBS is set to ON position.
	 Switch off the Mains switch and the AC switch on the RBS. Measure the resistance of the fuses with a multimeter to verify that they are undamaged. (The resistance should be 0 Ω). Then switch the power back on.
	 Measure, with a voltage meter, that 115/230 V is present at the incoming AC plinth on the AC-board in the interface box.

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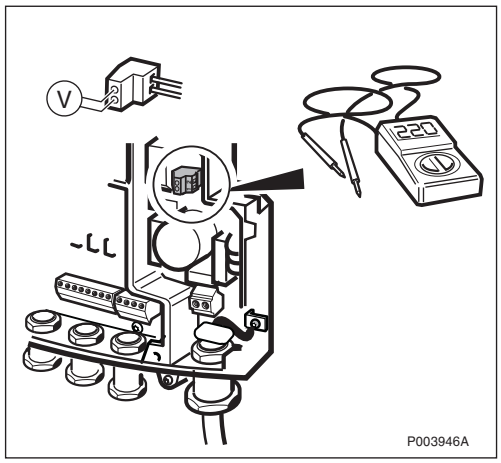
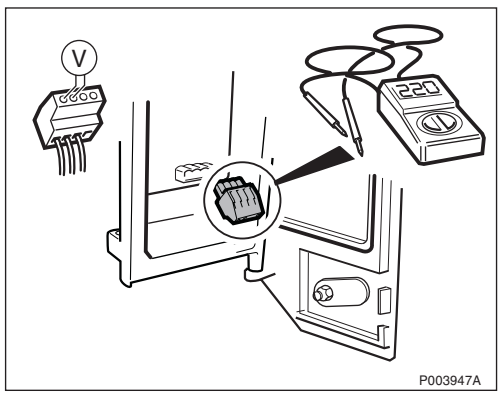
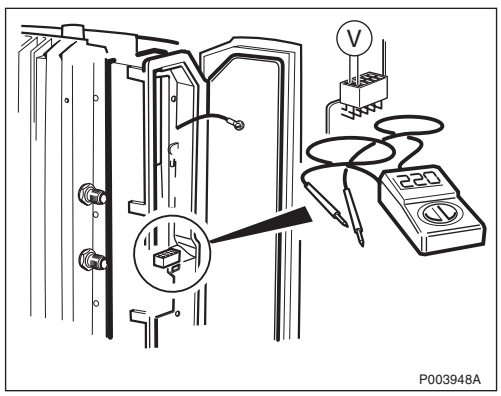


Measure that 115/230 V is present at the upper AC plinth on the AC-board, to verify that the AC-board is not faulty.



Measure that 115/230 V is present at the incoming AC plinth on the connection board, to verify that the cables are not faulty.



Measure that 115/230 V is present at the connector to the internal AC cable, to verify that the connection board is not defective.

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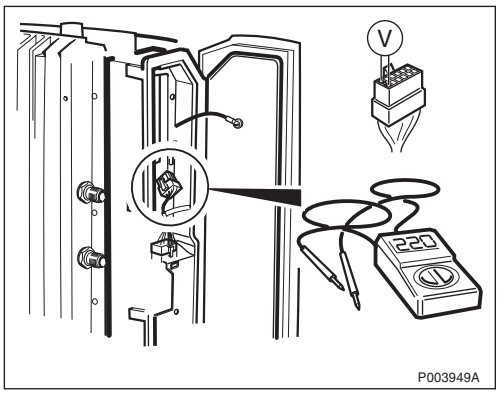
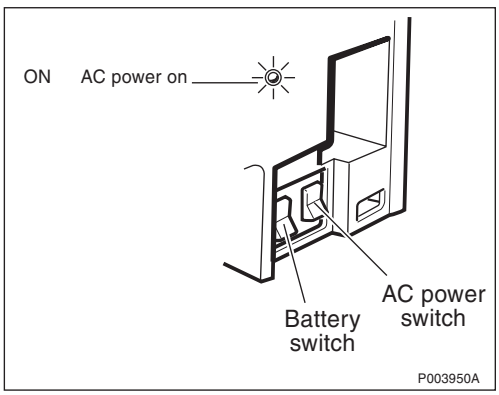
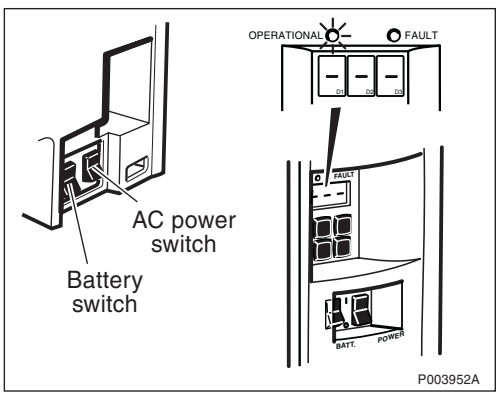
	 Measure that 115/230 V is present at the connector of the internal AC cable attached to the radio cabinet, to verify that the internal AC cable is undamaged. If voltage is present, replace the radio cabinet.

Table 61

Battery Fault	If the yellow LED is lit, 24 V supply is missing in the radio cabinet. Cause: the PSA or the battery is disconnected or low battery voltage in the internal battery. If the cabinet has been powered with backup battery it might take up to 24 hours until the battery is fully charged and the LED will turn off.
Case 1: Internal Backup Battery	 Confirm that the battery switch is in the ON position and that AC voltage is present, so that the backup battery has not run for so long that it is empty. If the battery is faulty, it must be replaced.
Case 2: External Power and Battery Cabinet with PSA and AC switch PBC.	

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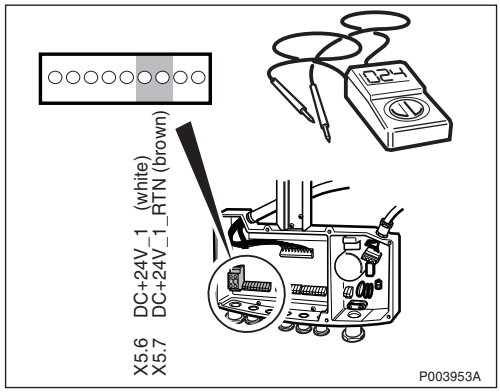
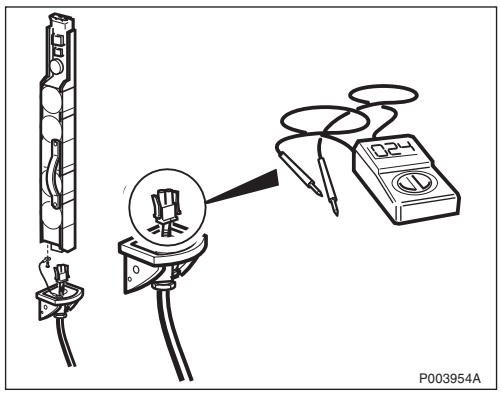
	Confirm that the battery switches on the RBS 2302 and the PBC are in the ON position. Verify that no error codes (see Error Code PBC) are displayed on the MMI of the PBC.
	 Measure the voltage over plinth X5.6 and X5.7 in the interface box in the PBC, to verify that the PBC supplies 24 V.
	 Examine the PSA cable by measuring that 24 V is present on the incoming connector to the PSA. If there is, replace the PSA. If not, replace the cable.

Table 62

External Alarms	If the yellow LED indicator is lit, this means either that auxiliary equipment is sending alarms, e.g burglar alarms, alarms or similar, or that an alarm is received from the PBC. Use the OMT to locate the active alarm(s). When software BSS R7 or later is loaded, the ARAE alarms (PBC alarms) are indicated on the LED "Fault" when active, if the optional PBC is used.

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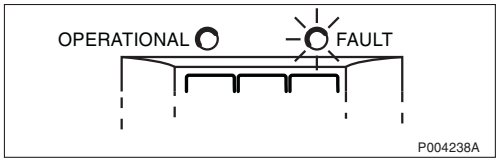
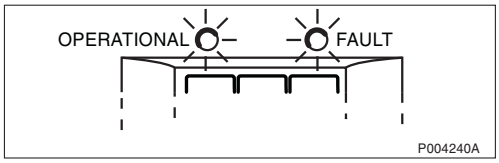
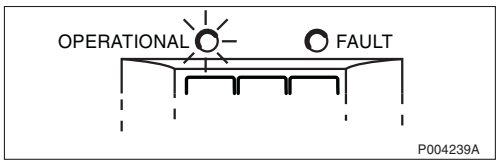
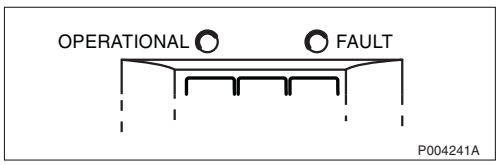
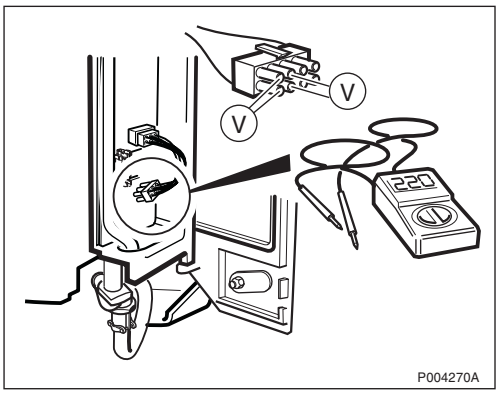
12.4.2 Fault Tracing Guidelines for the PBC

Table 63

	If the red LED "Fault" is lit but not the green LED "Operational" this means severe alarm and one or more units needs replacement. Use *Table 64 on page 345*, *Fault code list* to solve the problem.
	If the red LED "Fault" and the green LED "Operational" is lit this indicates Warning and one or more units needs service or replacement. Use *Table 64 on page 345*, *Fault code list* to solve the problem.
	If the green LED "Operational" is lit but not the red LED "Fault" this means that the Power and Battery Cabinet is operational and that no affecting alarms are active.
	None of the two LEDs "Operational" or "Fault" are lit. Possible causes:  1/ The battery cabinet has no power and the batteries have been discharged. Check if 115/ 230 V is present to the battery cabinet by measuring on the internal AC cable.

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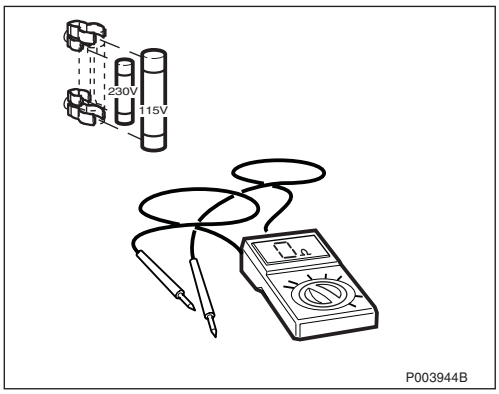
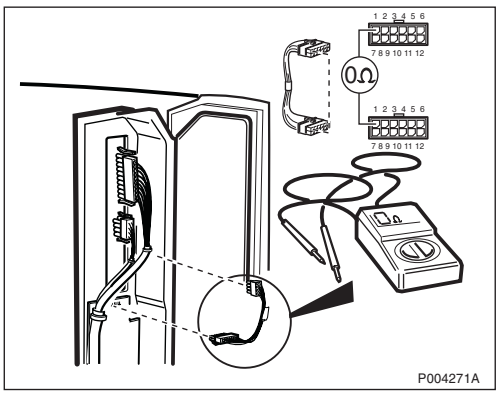


2/ The fuses are damaged and the batteries have been discharged. Turn off the Mains switch and the AC switch on the battery cabinet. Measure the resistance of the fuses with a multimeter to verify that they are undamaged. (The reistance should be 0 Ω).



3/ The display cable is faulty. If there is 115/ 230 V present to the battery cabinet, verify that the display cable is properly connected and functional. This is done by measuring the resistance from pin to pin.

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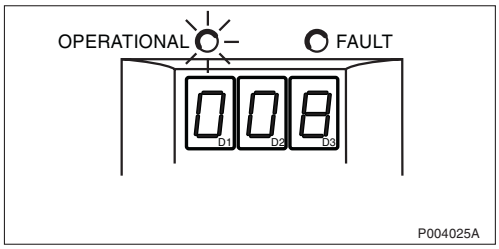
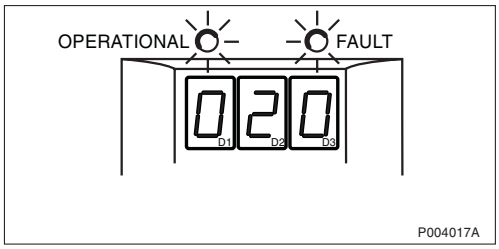
Fault Code List

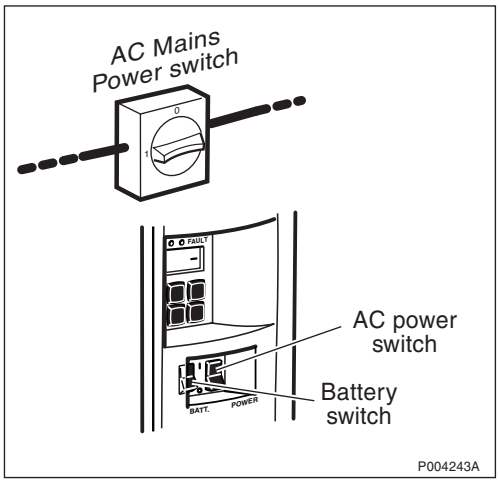
Table 64 Fault code list



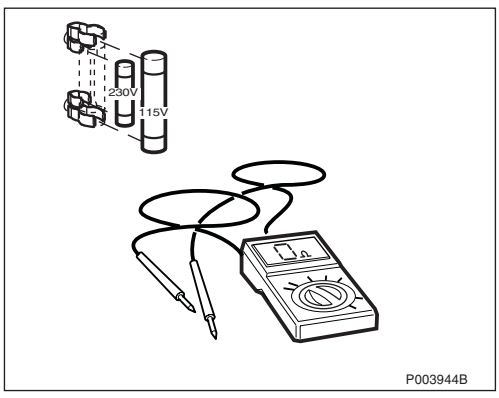
Overtemp historical. Ambient temperature might have been to high and/or circuits overloaded due to long charging of batteries.



When displayed, 115/230 V is not present in the battery cabinet.



Confirm that the Mains switch is set to the ON position and that the AC switch on the PBC is set to the ON position.



Switch off the Mains switch and the AC switch on the PBC. Measure the resistance of the fuses with a multimeter to verify that they are undamaged. (The resistance should be 0 Ω). Then switch the power back on.

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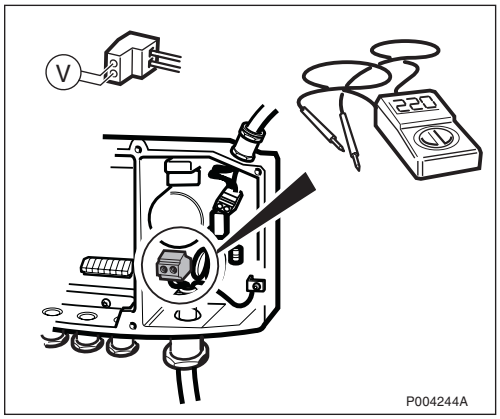
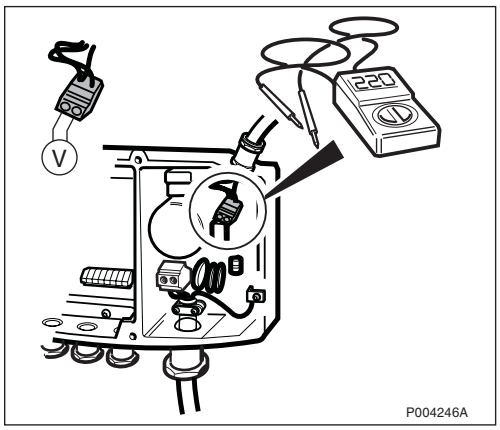
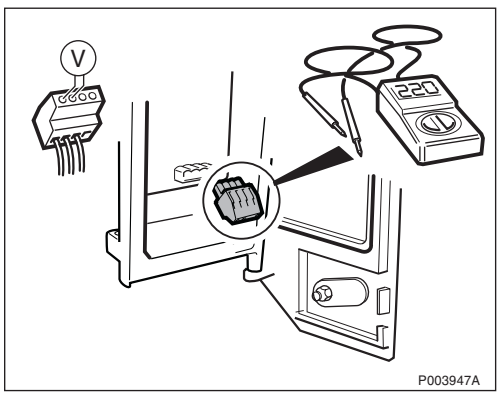


Measure with a voltage meter that 115/230 V is present at the incoming AC plinth on the AC board in the interface box.



Measure that 115/230 V is present at the upper AC plinth on the AC board to verify that the AC board is not faulty.



Measure that 155/230 V is present at the incoming AC plinth on the EMC board to verify that the cables are not faulty.

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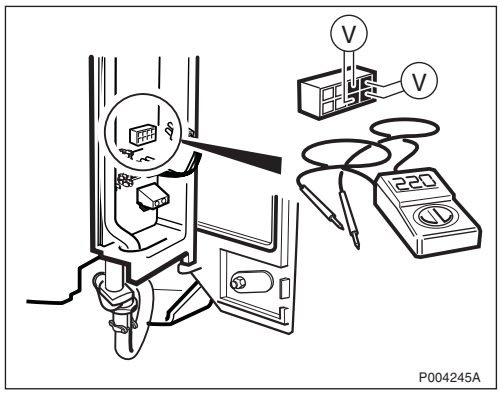
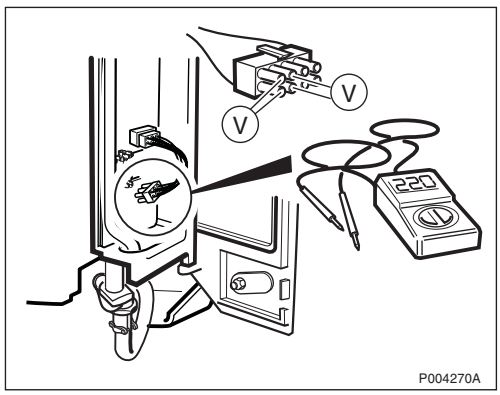
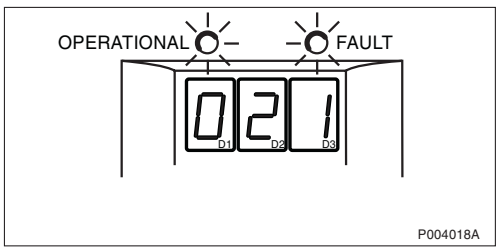


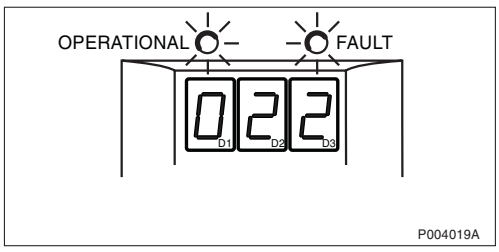
Measure that 155/230 V is present at the connector to the internal AC cable to verify that the EMC board is not faulty.



Measure that 155/230 V is present at the connector of the internal AC cable attached to the battery cabinet to verify that the internal AC cable is not faulty. If voltage is present, replace the battery cabinet.



AC/DC Fault. Replace the Cabinet.



DC/DC Overload.

1. Take the site out of service according to *Section 12.3.9 on page 331*.

2. On the DC Surge board, check the X5 connector and the -48 V DC connector to the antenna for shortcircuits.

After clearing any shortcircuits, start up the PBC.

- If no alarm appears, put the site into service according to *Section 12.3.10 on page 334*.
- If alarm appears, replace the Cabinet.

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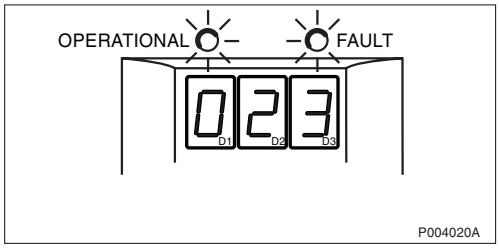
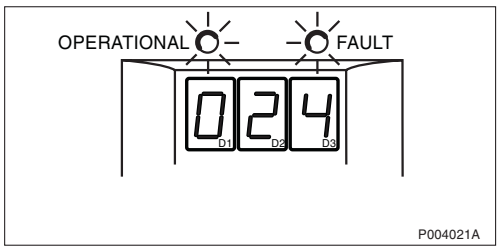
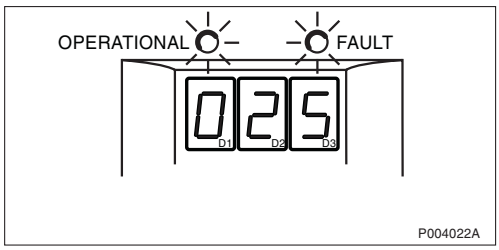
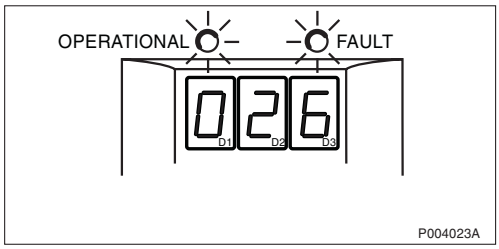
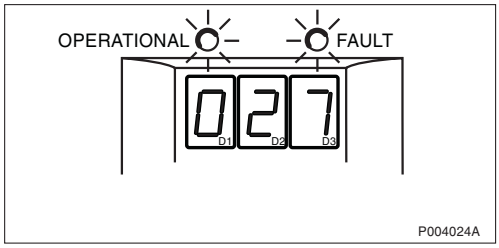
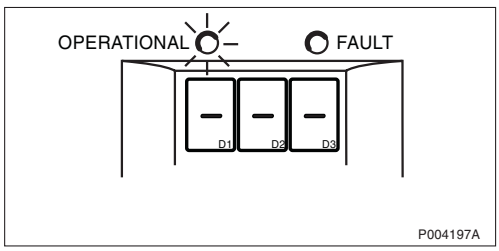
	*DC/DC Fault*. Replace the Cabinet.
	*Battery Fault*. Defective batteries or charging circuits are malfunctioning. Replace the batteries/power cabinet.
	*Battery Disconnected*. Inspect and verify that all battery cables are connected and that they are intact. Check that the automatic circuit breaker is in the ON position.
	*Low Battery Voltage.* The cabinets may have been running on battery backup and are currently recharging. If the fault indication persists for more than 24 hours, replace the batteries and/or the power cabinet.
	*Overtemp active.* This alarm might be active if the ambient temperature is above 40 °C. If the ambient temperature is normal, replace the power cabinet.
	*Operational*. No alarms present.

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12.5 Corrective Action for the RBS

12.5.1 HDSL Modem

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.

   If the PBC is not used, proceed to step 8.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the HDSL Modem

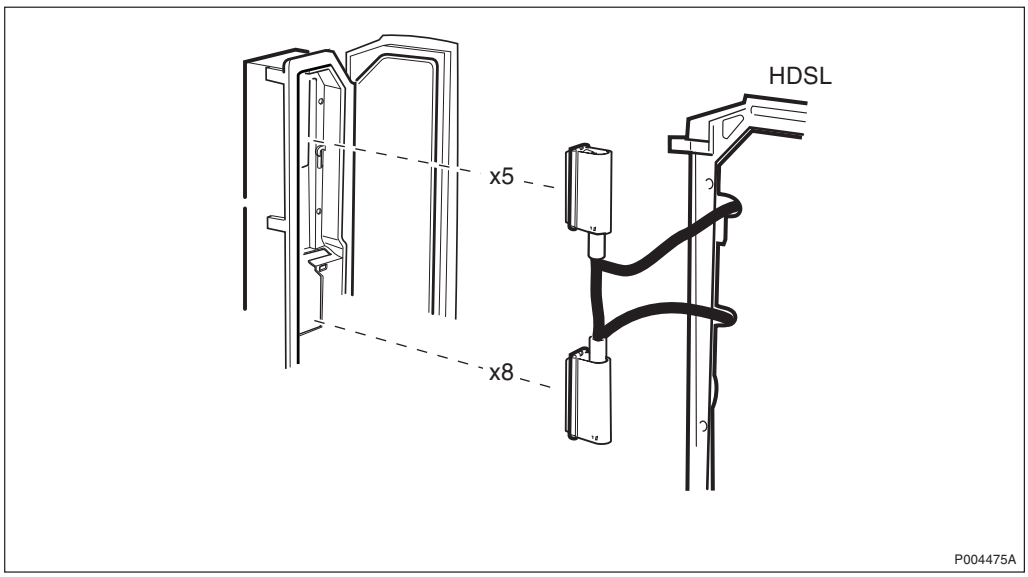

Figure 283 Disconnecting the cables

1. Disconnect the cables from the HDSL Modem.

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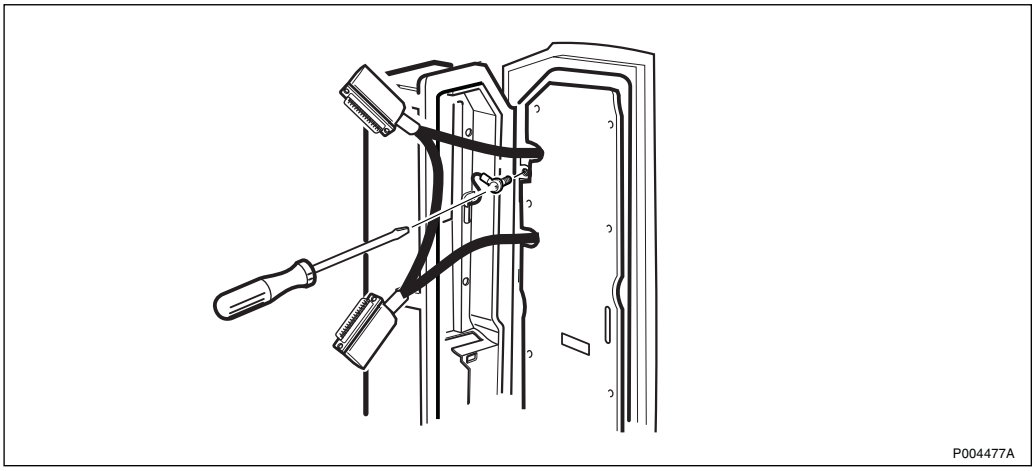

Figure 284 Disconnecting the Protective Earth

2. Disconnect the Protective Earth from the HDSL Modem.

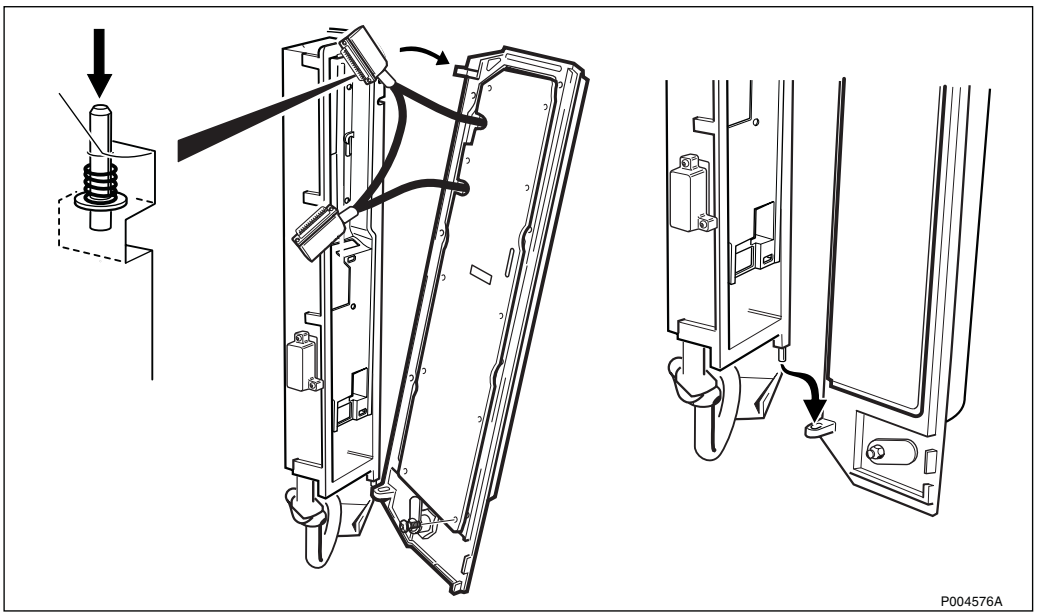

Figure 285 Dismantling the faulty HDSL Modem

3. Dismantle the faulty HDSL Modem.

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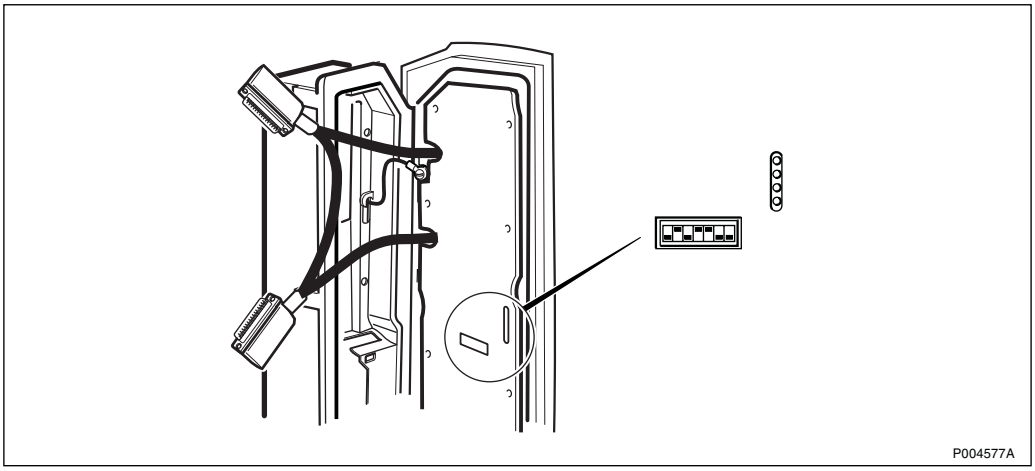

Figure 286 Position of the DIP switches

4. Choose the appropriate settings for the new Modem with the DIP switches located on the printed circuit board according to the settings of the dismantled HDSL-modem. Complete information about the settings if a reconfiguration is necessary is found in the section about the HDSL modem in the *chapter Site Installation Tests*.
5. Mount the new HDSL Modem by reversing the dismantling procedure.

Set to operation

1. Turn the AC Mains Power switch to ON position.

   If the PBC is not used, proceed to step 4.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.

Test after corrective action

1. Wait for the green light on the HDSL Modem.
2. Perform the checklist in *Section 12.9 on page 452*.

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12.5.2 Fan Unit (Optional)

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

Prior to Replacement

WARNING

Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.

1. Set the AC switch for the Fan Unit in OFF position.

   If there is no separate AC switch for the Fan Unit, continue with the steps below to take the RBS out of service.

2. Inform the OMC operator that the RBS will be removed from service temporarily.
3. Open the RBS installation box door.
4. Set the RBS to local mode.
5. Turn off the battery switch on the RBS.
6. Turn off the AC switch on the RBS.

   If a PBC is used, continue with the steps below.

7. Turn off the battery switch on the PBC.
8. Turn off the AC switch on the PBC.

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Replacing the Fan Unit

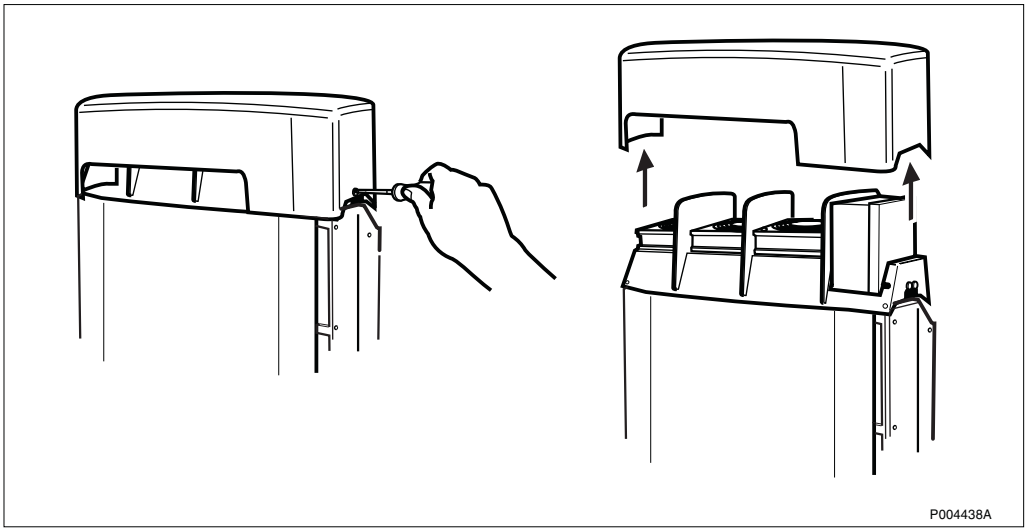

Figure 287 Removing the cover

1. Remove the Fan Unit cover by unscrewing the screws on each side.

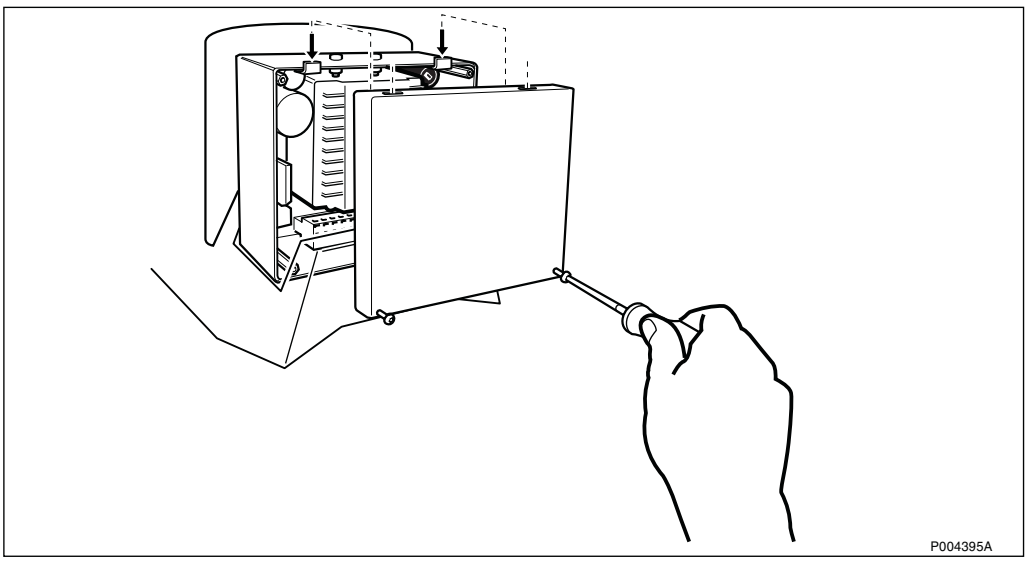

Figure 288 Opening the control box

2. Open the Fan Unit control box by unscrewing the two screws.

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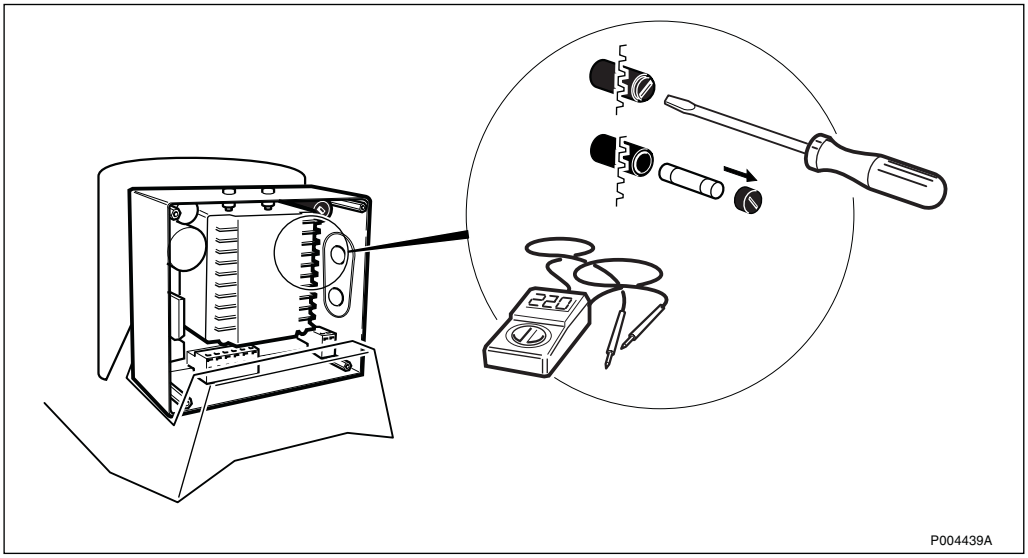

Figure 289 Inspecting the fuses

3. Inspect the fuses to see if they are damaged, and replace them if necessary.

Table 65 Fuses

Voltage	Fuses Data	Dimension
100-127 V AC	Ceramic Slow Blow 6.3 AT, 250 V (1)	5x20 mm
200-250 V AC	Ceramic Slow Blow 6.3 AT, 250 V (1)	5x20 mm

(1) Fuse according to standard EN 60127.

4. If the fuses were damaged, proceed to *Section Test after corrective action on page 356.*

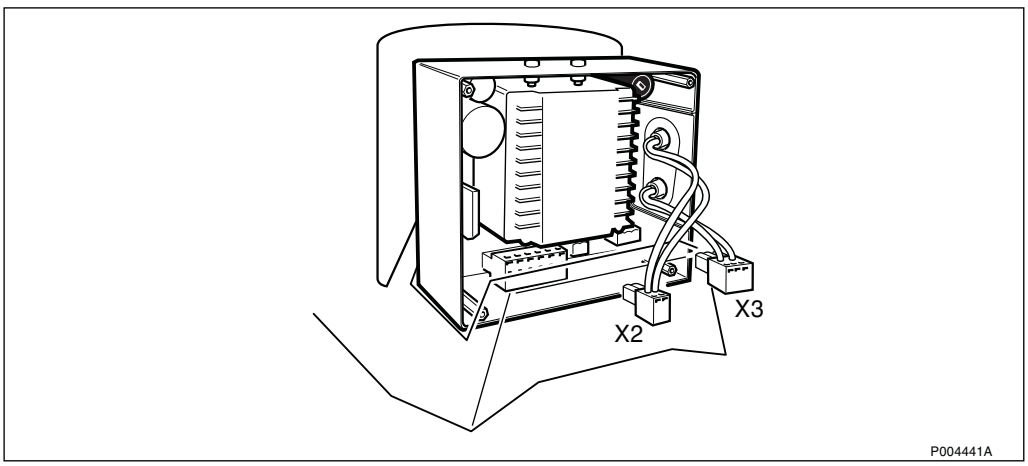

Figure 290 Unplugging the fast connection plinths

5. Unplug the fast connection plinths for the alarm cable (x2) and the AC cable (x3), and disconnect the protective earth cable.

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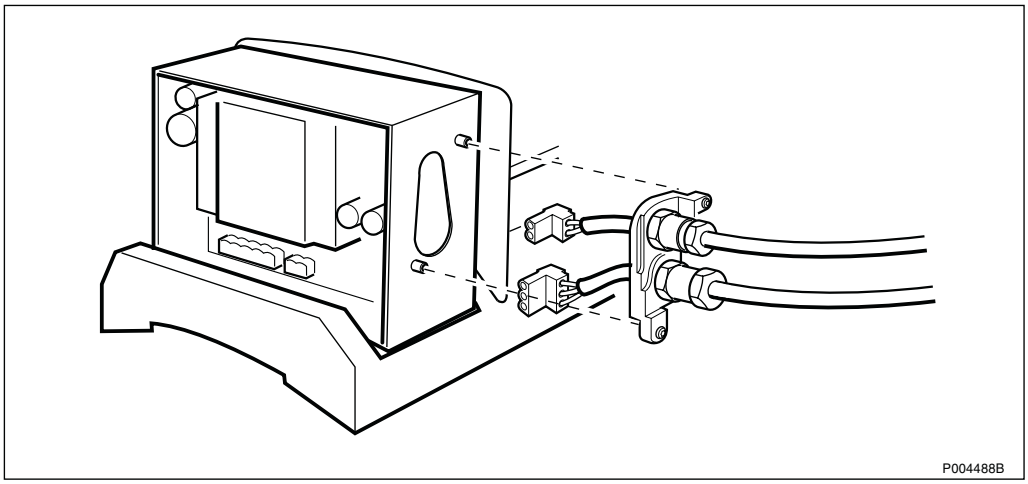

Figure 291 Loosening the cable feed through plate

6. Loosen the cable feed through plate by unscrewing the two screws.
7. Pull out the alarm cable and the AC cable.

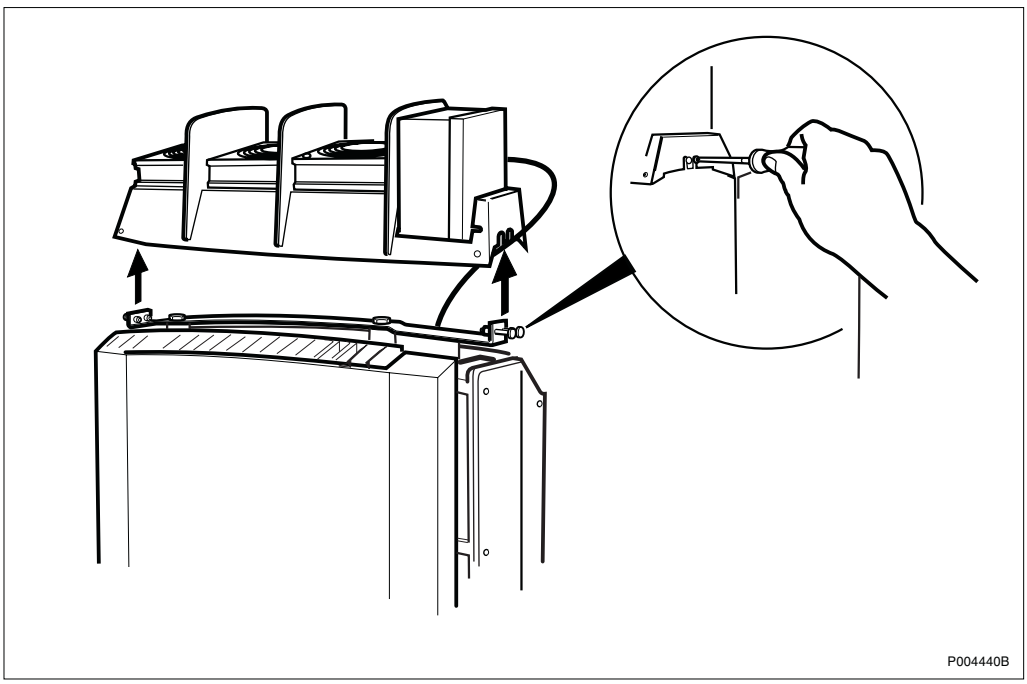

Figure 292 Loosening the Fan Unit

8. Loosen the Fan Unit from the bracket by unscrewing the screws on the short sides.

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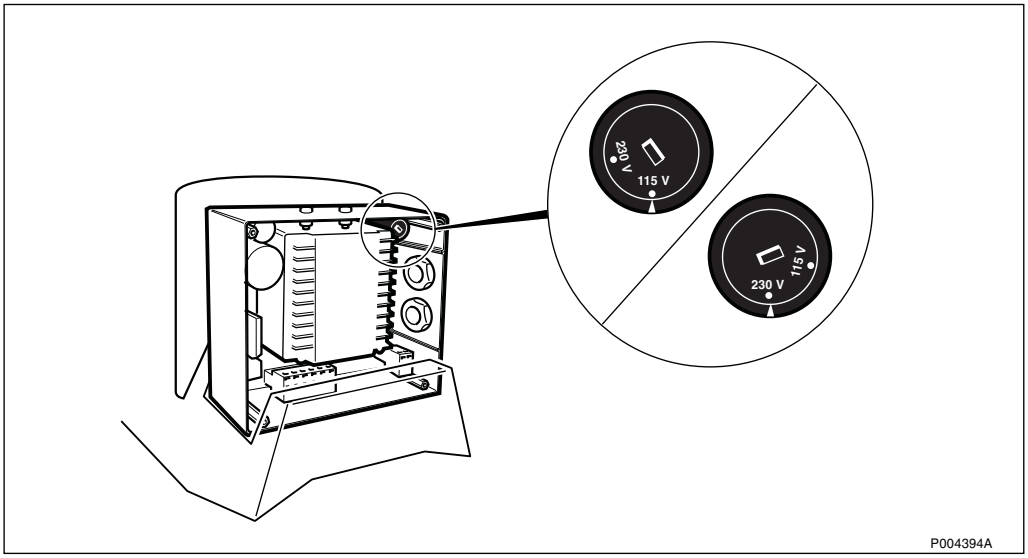

Figure 293 AC selector

9. Verify that the voltage selector on the new Fan Unit is set to the right voltage and that the fuses are mounted.
10. Mount the new Fan Unit and tighten the two screws.
11. Insert the cables through the control box according to the *Figure 291 on page 355* and tighten the two screws.
12. Plug in the fast connection plinths for the alarm cable (x2) and the AC cable (x3), and reconnect the protective earth cable.

Set to operation

1. Set the AC switch for the Fan Unit in ON position.

   If there is no separate AC switch for the Fan Unit, continue with the steps below.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.

Test after corrective action

1. Press the button located to the left part of the AC plinth in the control box and make sure that all three fans are running.
2. Mount the cover on the Fan Unit control box and tighten the two screws.
3. Mount the cover on the Fan Unit and tighten it with the one screw on each side.

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12.5.3 Sunshields

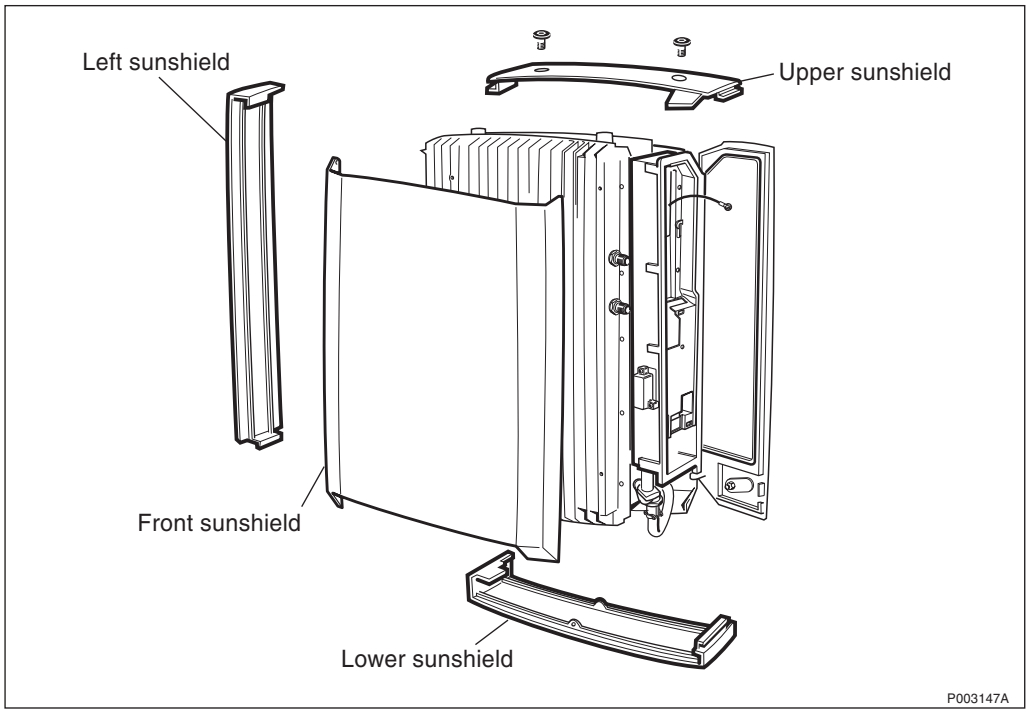

Figure 294 Sunshields overview

Replacing the front sunshield

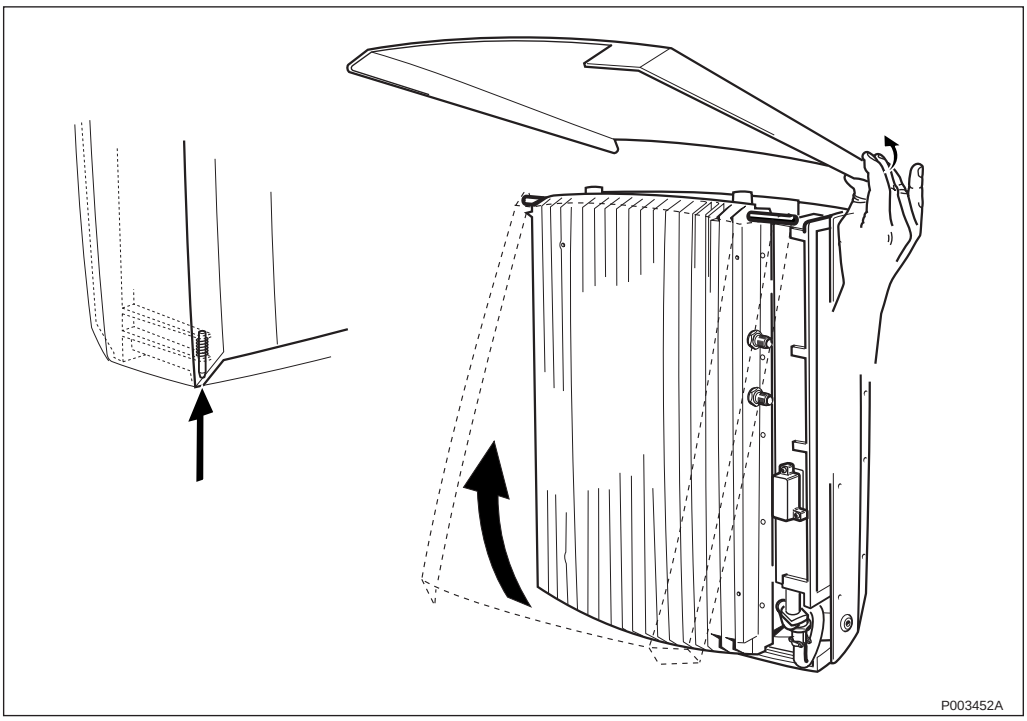

Figure 295 Replacing the front sunshield

1. Inform the OMC operator that the RBS will be removed from service temporarily.

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Note: If an external antenna is used the RBS does not need to be removed from service.

2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Remove the antenna. If the used antenna is not an *external antenna, see Section 12.5.4 Sector Antenna on page 367* and *Section 12.5.5 Omnidirectional Antenna on page 369.*
5. Push up the spring locking pin, located in the lower left hand corner.
6. Pull out the lower part of the sunshield.
7. Carefully bend out the sides at the top of the sunshield so that the sunshield snaps off.
8. Mount the new front sunshield.
9. Fold down the sunshield.

Note: Make sure that no cables are bent or squeezed.

10. Push the lower left hand corner towards the RBS, so that the spring locking pin snaps into position.
11. Set the RBS in Remote Mode.
12. Close the installation box door.

Replacing the lower sunshield

Note: If the omnidirectional antenna is used, it replaces the lower sunshield but the procedure of replacing it is the same.

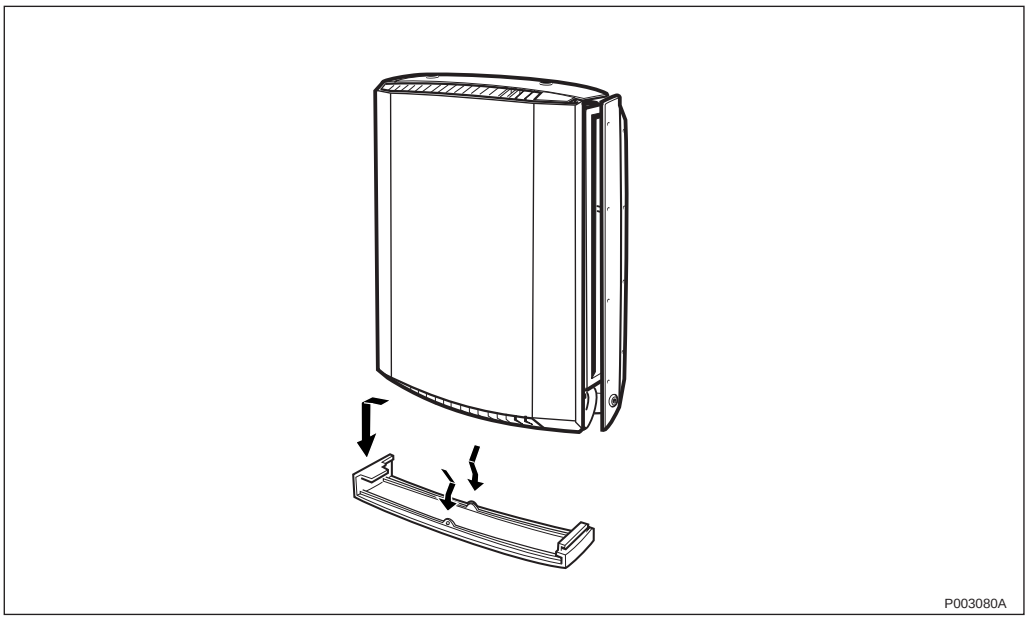

Figure 296 Replacing the lower sunshield

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1. Inform the OMC operator that the RBS will be removed from service temporarily.

Note: If an external antenna is used the RBS does not need to be removed from service.

2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Remove the antenna. If the used antenna is not an *external antenna, see Section 12.5.4 Sector Antenna on page 367* and *Section 12.5.5 Omnidirectional Antenna on page 369*.
5. Unsnap the sunshield by pressing the fasteners, located on the middle on the sunshield.
6. Pull the sunshield down and unhook it.
7. Mount the new sunshield in its cut-out in the left side of the radio cabinet.
8. Snap the sunshield into position.
9. Set the RBS in Remote Mode.
10. Close the installation box door.

Replacing the left sunshield

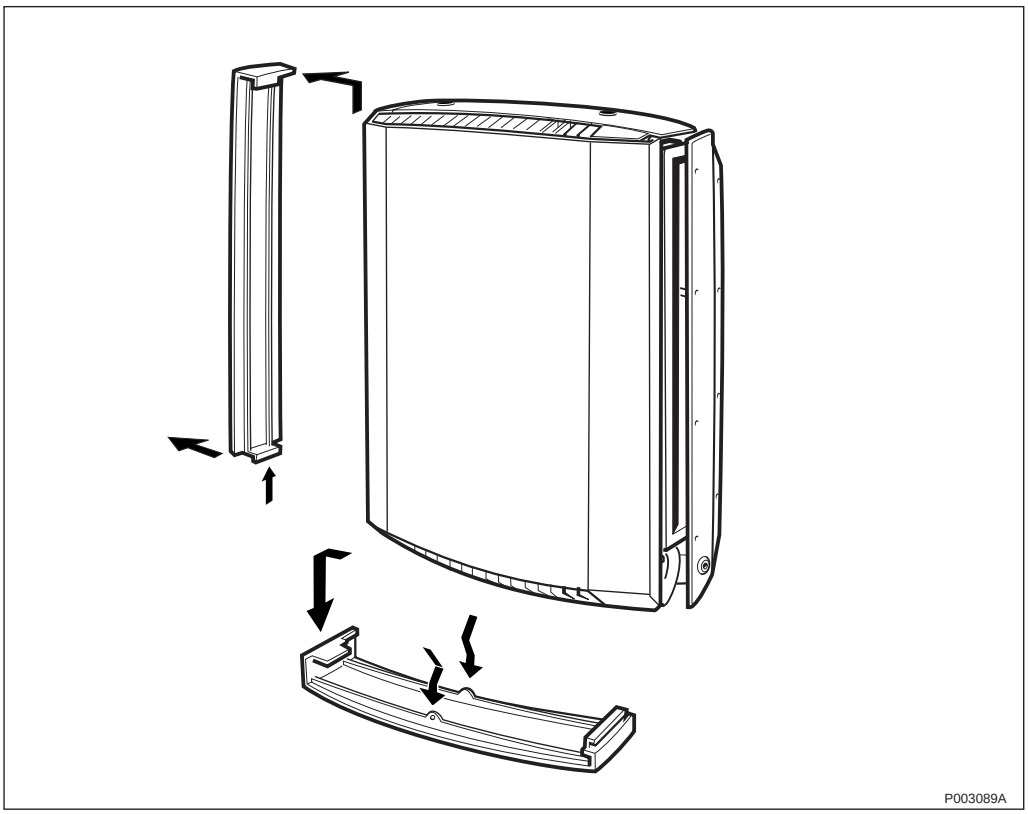

Figure 297 Replacing the left sunshield

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1. Inform the OMC operator that the RBS will be removed from service temporarily.

Note: If an external antenna is used the RBS does not need to be removed from service.

2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Remove the antenna. If the used antenna is not an *external antenna, see Section 12.5.4 Sector Antenna on page 367* and *Section 12.5.5 Omnidirectional Antenna on page 369*.
5. Remove the lower sunshield.
6. Unsnap the lower part of the left sunshield and unhook the sunshield from the RBS.
7. Mount the new left sunshield.
8. Mount the lower sunshield.
9. Set the RBS in Remote Mode.
10. Close the installation box door.

Replacing the upper sunshield

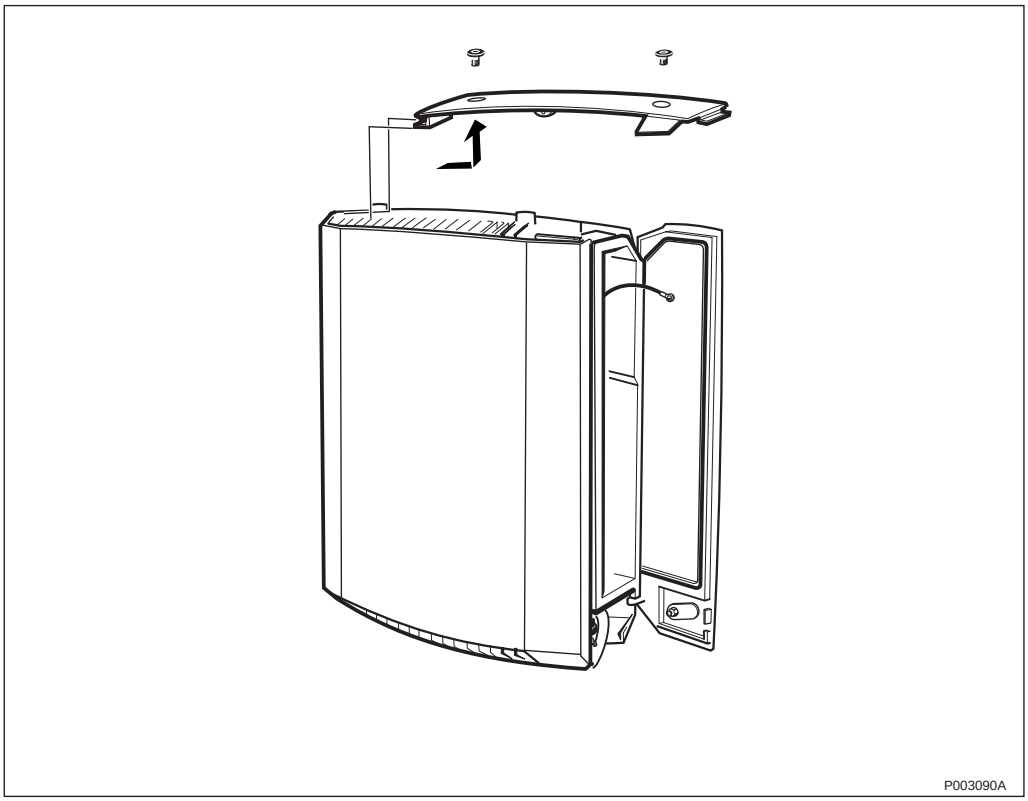

Figure 298 Replacing the upper sunshield

1. Inform the OMC operator that the RBS will be removed from service temporarily.

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Note: If an external antenna is used the RBS does not need to be removed from service.

2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Remove the antenna. If the used antenna is not an *external antenna, see Section 12.5.4 Sector Antenna on page 367* and *Section 12.5.5 Omnidirectional Antenna on page 369*.
5. Remove the screwplugs.
6. Unsnap the upper sunshield, by pressing on the middle.
7. Pull the sunshield up and to the right, and remove it.
8. Mount the new sunshield.
9. Seal the two holes with the screwplugs.
10. Set the RBS to Remote Mode.
11. Close the installation box door.

Replacing the rear sunshield

Note: To replace the rear sunshield, the cabinet must first be placed on the ground.

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 8 on page 361*.

6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.
9. Remove the sunshields (front, lower, left and upper).
10. Remove the cabinet, *see page 377*.

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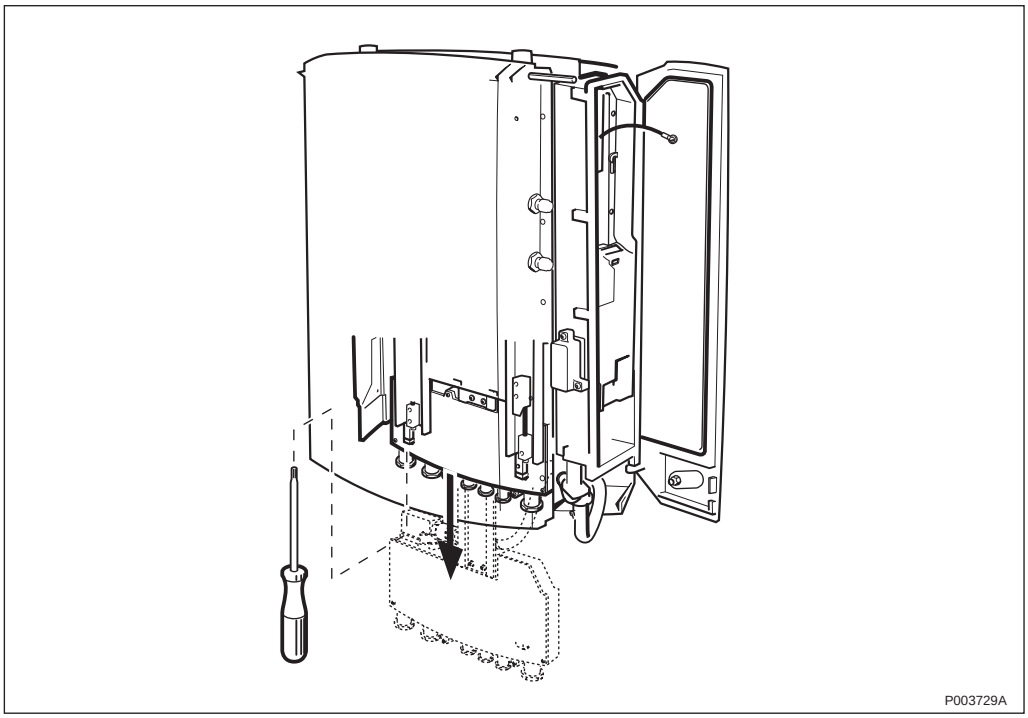

Figure 299 Releasing the interface box

11. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

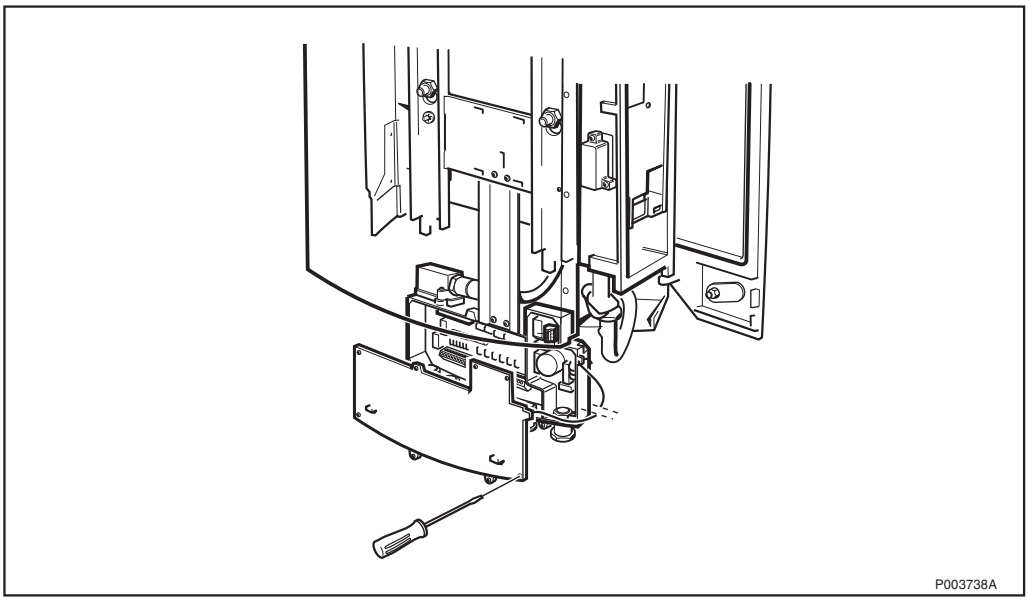

Figure 300 Loosening the interface box cover

12. Open the cover of the interface box by removing the 8 torx screws.

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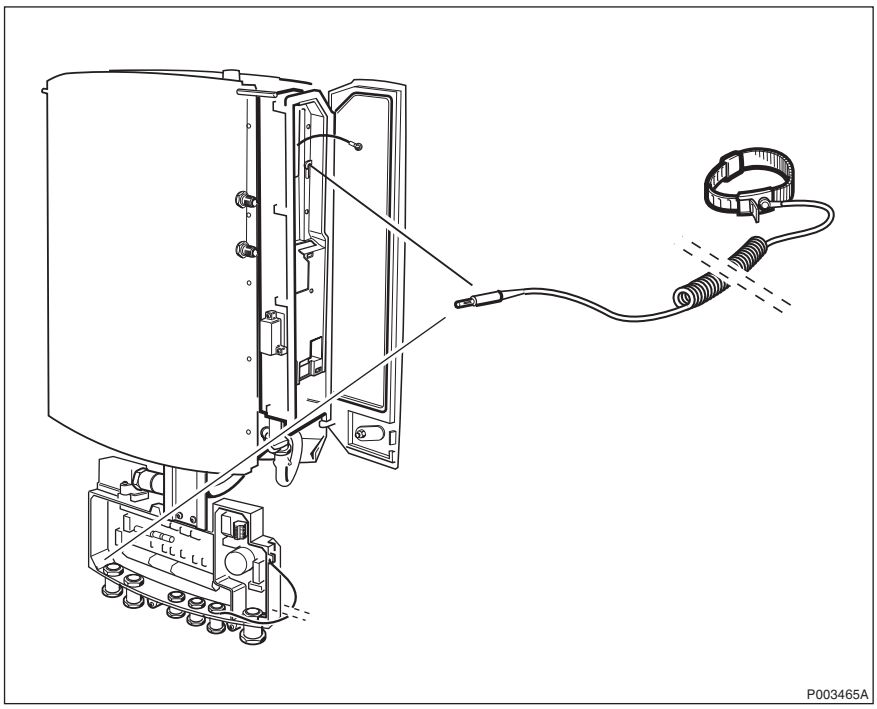

Figure 301 Connecting the ESD wrist strap

13. Connect the ESD wrist strap to the ESD connection point in the installation box.

Note: You have ten seconds to perform *step 14 on page 363*to maintain the PCM link between the BSC and the other cascade connected radio cabinets. This step is only valid when the PCM B is used in a cascade connection.

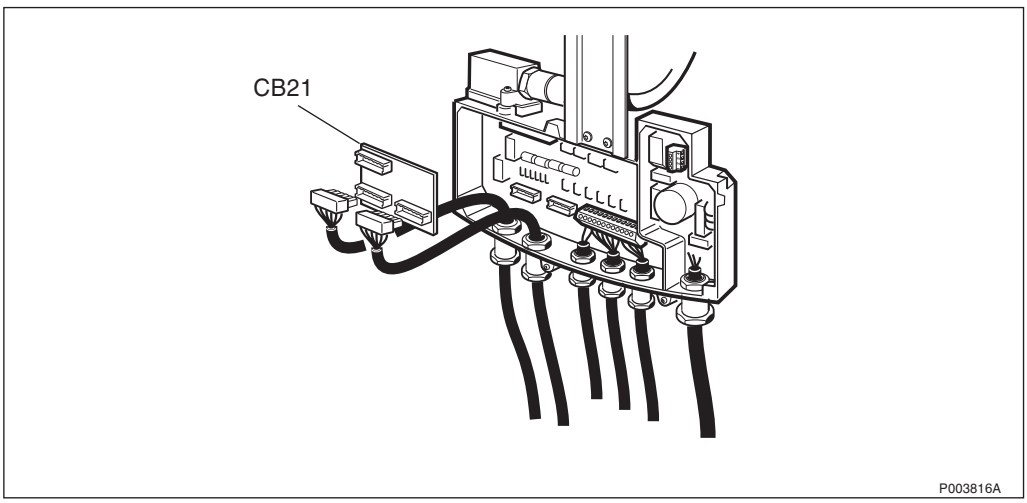

Figure 302 Mounting the CB21 connection board

14. Remove the connection terminal blocks for the PCM lines and mount the connection board CB21 on the two PCM terminal blocks.

15. Remove all remaining connection terminal blocks, including the AC terminal block.

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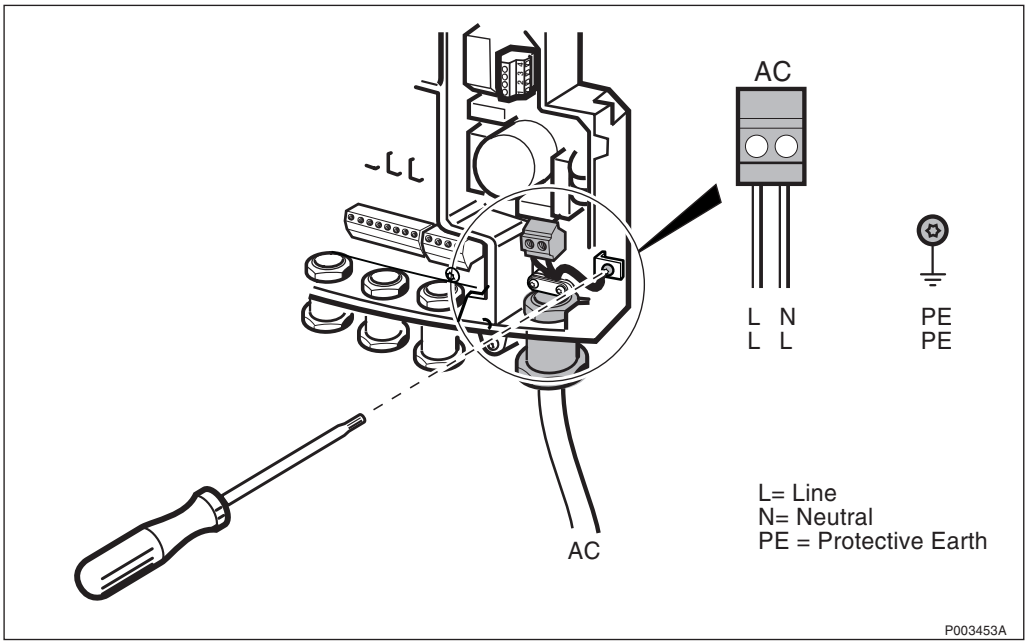

Figure 303 Loosening the Protective Earth in the AC section of the interface box

16. Loosen the Protective Earth in the AC section of the interface box.
17. Loosen the two screws on the AC pull-relief clamp.
18. Dismount the cable gland.
19. Pull out the AC cable.

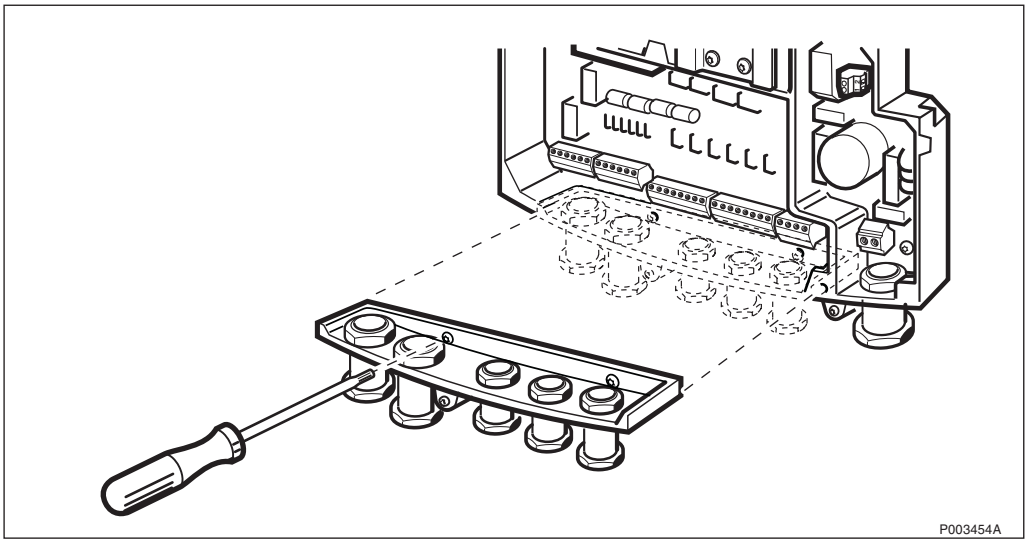

Figure 304 Loosening the gland plate

20. Remove the cable gland plate by unscrewing the two torx screws.

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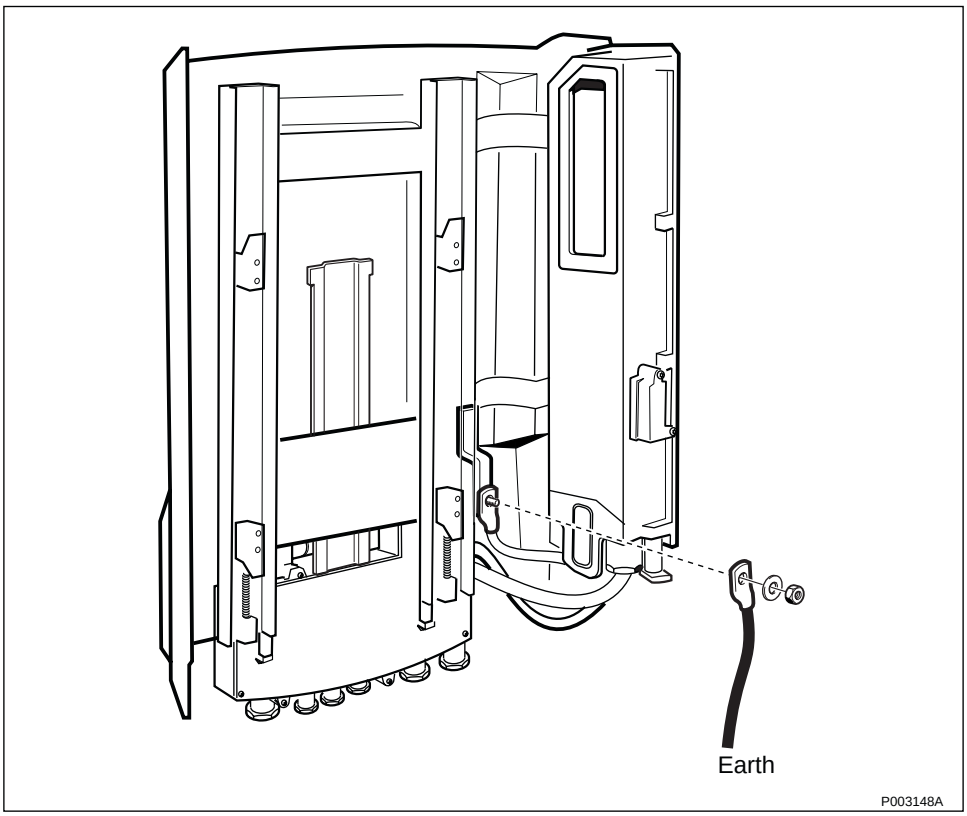

Figure 305 Removing the earth cable

21. Remove the earth cable on the mounting base.
22. Loosen the four nuts securing the mounting base.
23. Lift up the mounting base and pull it away from the wall bracket.
24. Place the mounting base on the ground.

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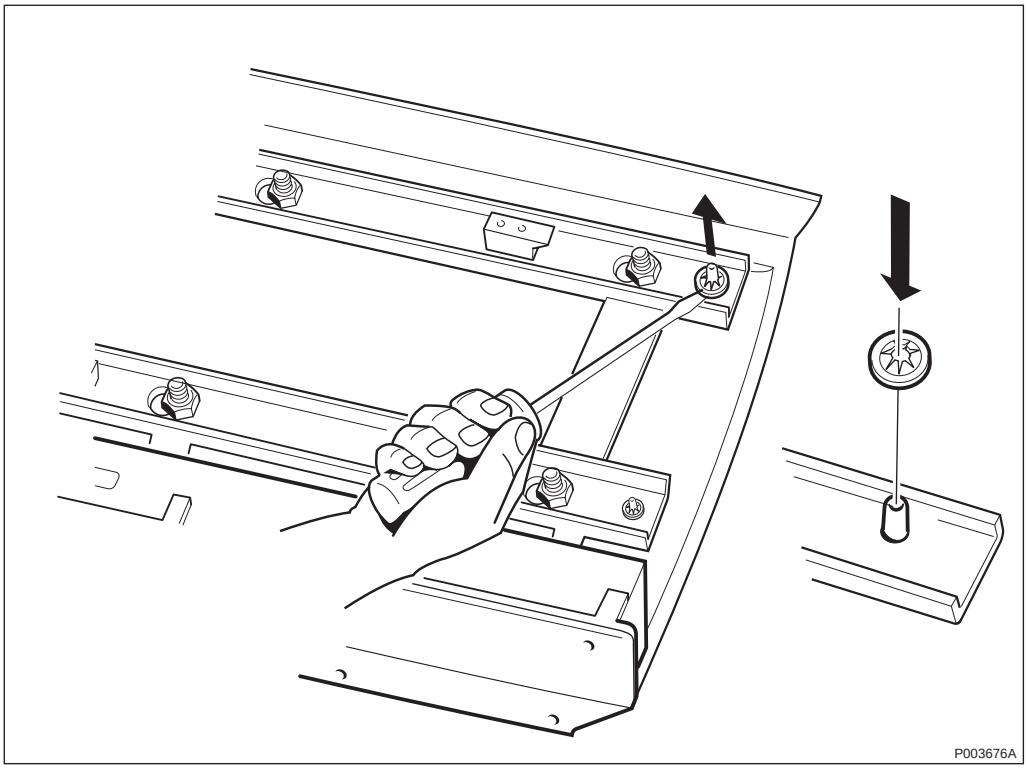

Figure 306 Removing locking washers

25. Remove the four locking washers with a screwdriver.
26. Separate the rear sunshield from the mounting base.
27. Mount the new rear sunshield and the new locking washers.
28. Remount the mounting base on the mounting plate.
29. Tighten the four nuts holding the mounting base.
30. Reconnect the earth cable to the mounting base.
31. Mount the gland plate and fasten the screws.
32. Insert the AC cable and connect the Protective Earth.

Note: You have ten seconds to reinstall the PCM terminal blocks, *see step 33 on page 366.*

33. Disconnect the connection board CB21 and remount the connection terminal block for the PCM line on the transmission board.
34. Remount the remaining connection terminal blocks.
35. Remount the cover of the interface box and tighten the screws.
36. Push up the interface box and secure it in the upper position with the two torx screws.
37. To remount the cabinet on the mounting base, *see chapter Installation of RBS 2302*.

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Set to Operation

1. Turn the AC Mains Power switch to ON position.

If the PBC is not used, proceed to *step 4 on page 367*.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC Battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the Battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.5.4 Sector Antenna

WARNING

Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.

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Replacing the Sector Antenna

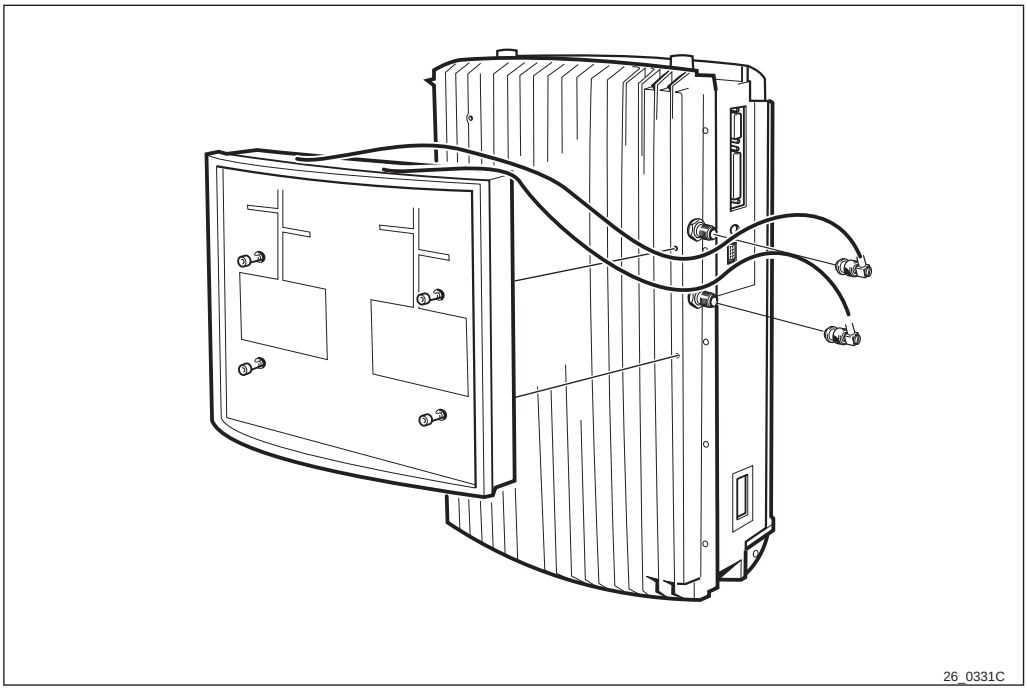

Figure 307 Sector antenna

1. Remove the front sunshield.

Note: Make sure that all cables are properly labelled before disconnecting them.

2. Disconnect the antenna cables.
3. Remove the antenna by loosening the four torx screws holding it in place.
4. Mount the new antenna.

Note: Make sure that no cables are bent or squeezed.

5. Fasten the four torx screws.
6. Reconnect the antenna cables.
7. Mount the front sunshield, *see chapter Installation of RBS 2302*.
8. Set the RBS to Remote Mode.
9. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

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12.5.5 Omnidirectional Antenna

WARNING

Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.

Replacing the Omnidirectional Antenna

The Omnidirectional antenna is placed underneath the radio cabinet.

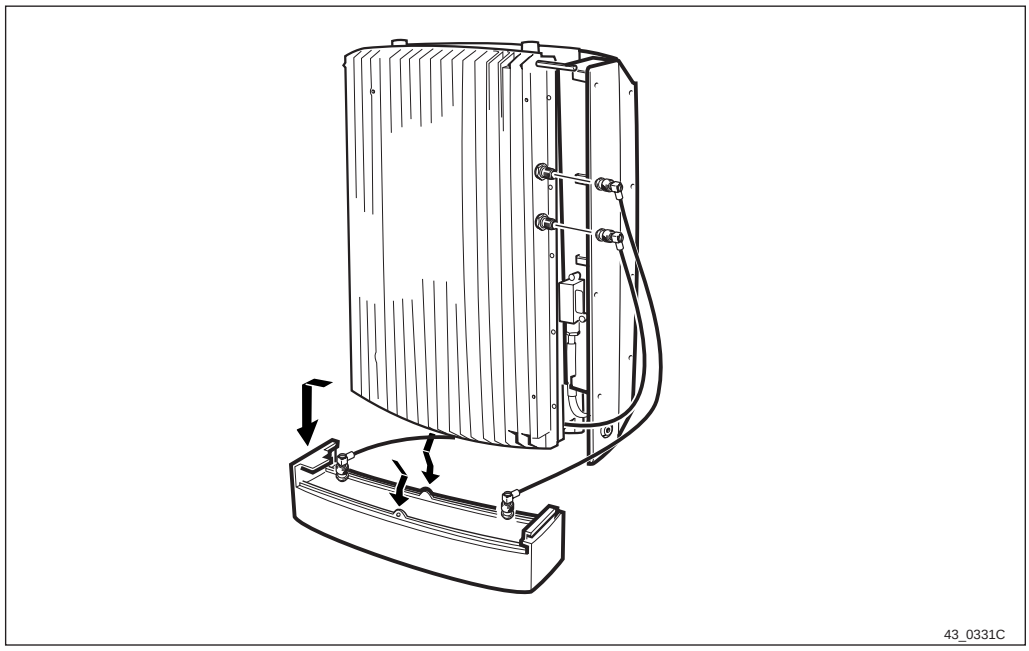

Figure 308 Omnidirectional Antenna

Note: Make sure that all cables are properly labelled before disconnecting them.

1. Disconnect the antenna cables.
2. Remove the front sun shield.
3. Unsnap the antenna by pressing the fasteners, located in the middle on the antenna.
4. Pull the antenna down and unhook it.

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5. Replace the old antenna with the new.
6. Reconnect the antenna cables.
7. Set the RBS to Remote Mode.
8. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.5.6 External Antenna

WARNING

Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.

Replacing the External antenna

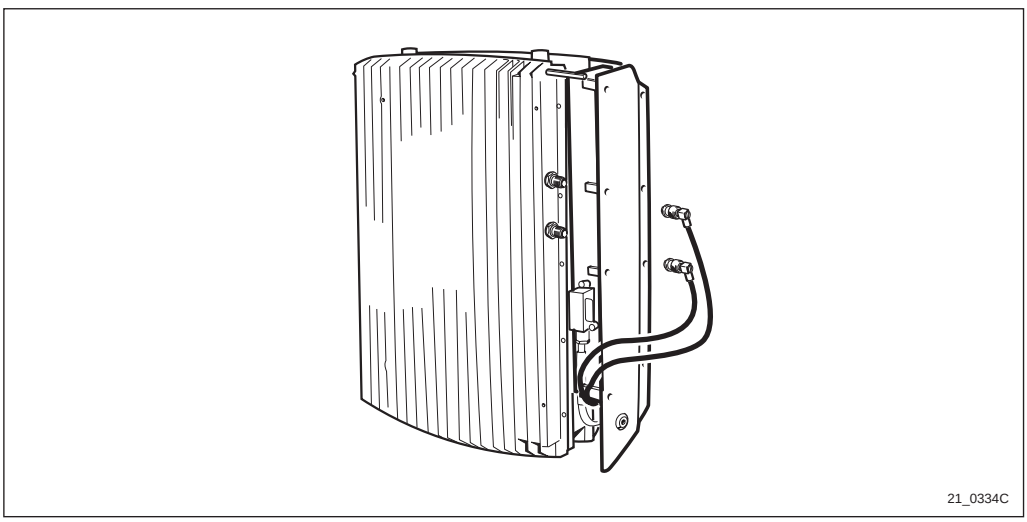

Figure 309 External Antenna Cables

1. Remove the front sunshield and the lower sunshield.

Note: Make sure that all cables are properly labelled before disconnecting them.

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2. Disconnect the antenna cables.
3. Remove the antenna.
4. Mount the new antenna.
5. Reconnect the antenna cables.
6. Remount the lower sunshield and the front sunshield.
7. Set the RBS to Remote Mode.
8. Close the installation box door.

Test after corrective action

1. Perform Antenna Installation Tests, *see chapter Antenna System Tests*.
2. Perform the checklist in *Section 12.9 on page 452*.

12.5.7 Multicasting Box

WARNING

Radio frequency radiation. The radio frequency radiation from the antenna system might endanger your health. Switch off the transmitter when working with antennas or near them.

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.

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Replacing the Multicasting Box

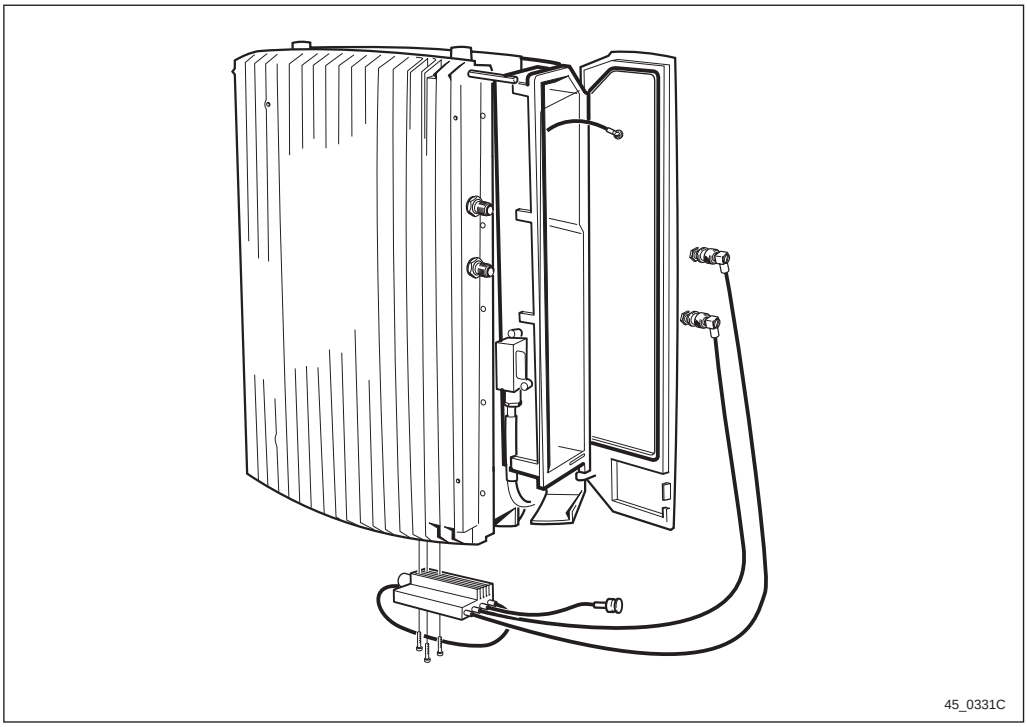

Figure 310 Multicasting Box

1. Remove the lower sunshield by pressing the fasteners, located on the middle on the sunshield.

Note: Make sure that all cables are properly labelled before disconnecting them.

2. Disconnect the antenna cables connected to the radio cabinet.
3. Disconnect the external antenna cable connected to the multicasting box.
4. Remove the multicasting box by loosening the three torx screws.
5. Mount the new multicasting box.
6. Reconnect the external antenna cable.
7. Reconnect the antenna cables to the cabinet.
8. Mount the lower sunshield.

Set to Operation

1. Set the RBS to Remote Mode.
2. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

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12.5.8 Battery

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch off the AC Mains Power switch.

Replacing the battery

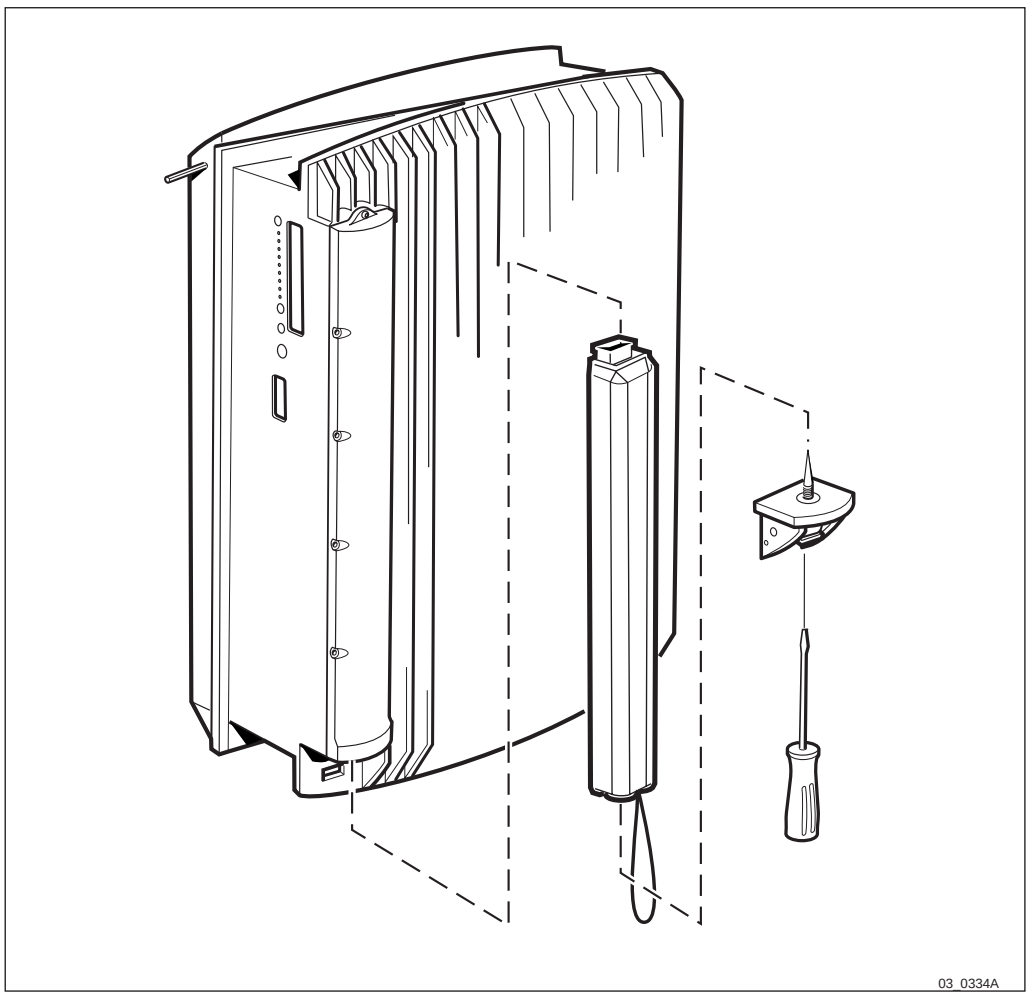

Figure 311 Replacing the battery

1. Unscrew the battery cover.
2. Replace the faulty battery with the new battery.
3. Remount the battery cover.
4. Switch on the AC switch and the battery switch.

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5. Verify the new battery by switching the AC switch to OFF and inspect the battery fault indicator.
6. If the fault LED is OFF, set the AC switch to on.
7. Set the RBS in Remote Mode.
8. Close the installation box door.

The new battery might be discharged. It will then take up to 25 hours until full performance is achieved.

Test after corrective action

1. Request the BSC operator to set the RBS ready for traffic.
2. Perform the checklist in *Section 12.9 on page 452*.

12.5.9 Cables

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 8 on page 374*.

6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

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Replacing the cables

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

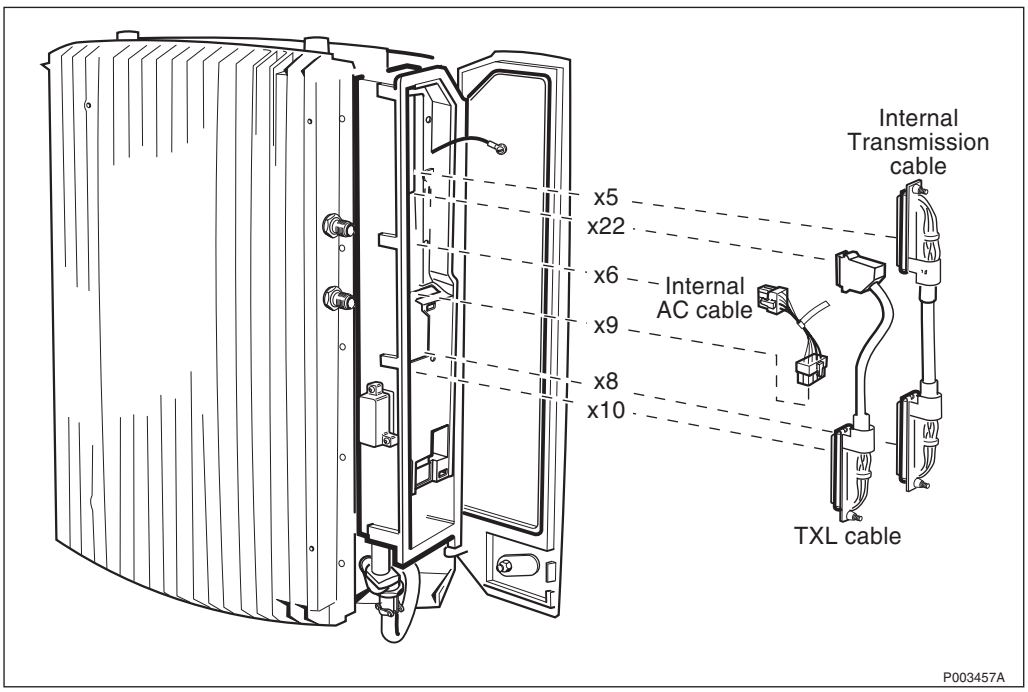

Figure 312 Overview of the cables

For the sake of clarity the cabinet is shown without the sunshields and the antennas.

1. Verify that the AC Mains power switch, located outside the cabinets, is in OFF position.

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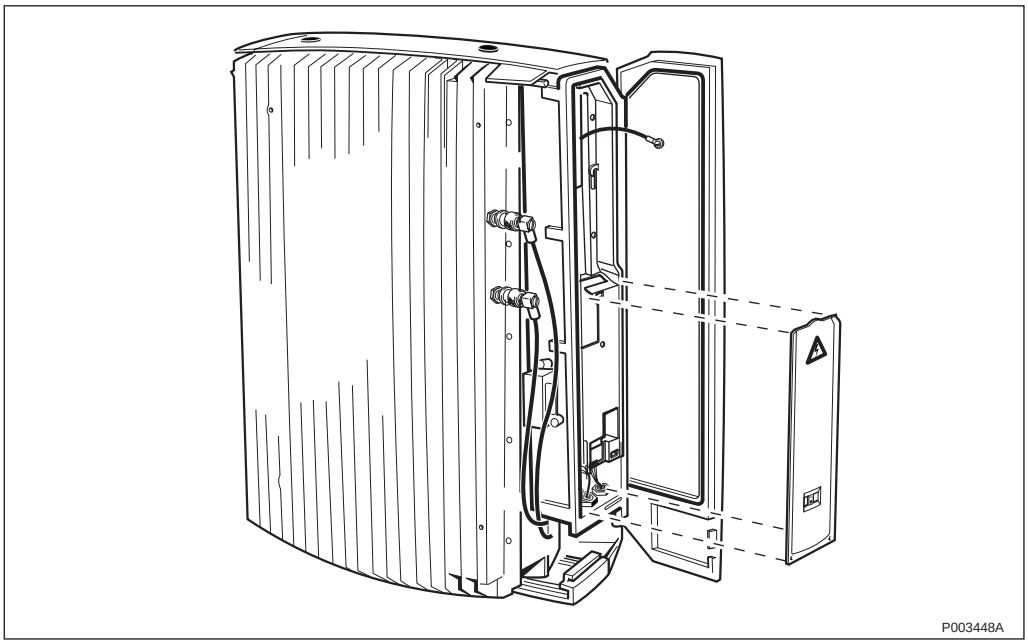

Figure 313 Removing the outer protective cover

2. Unsnap the outer protective cover and remove it.

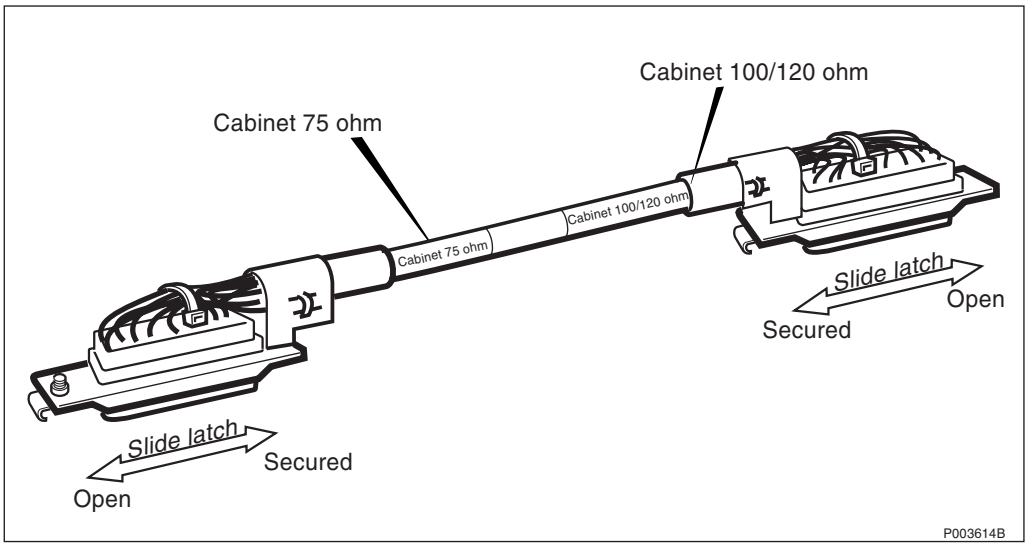

Figure 314 Internal transmission cable

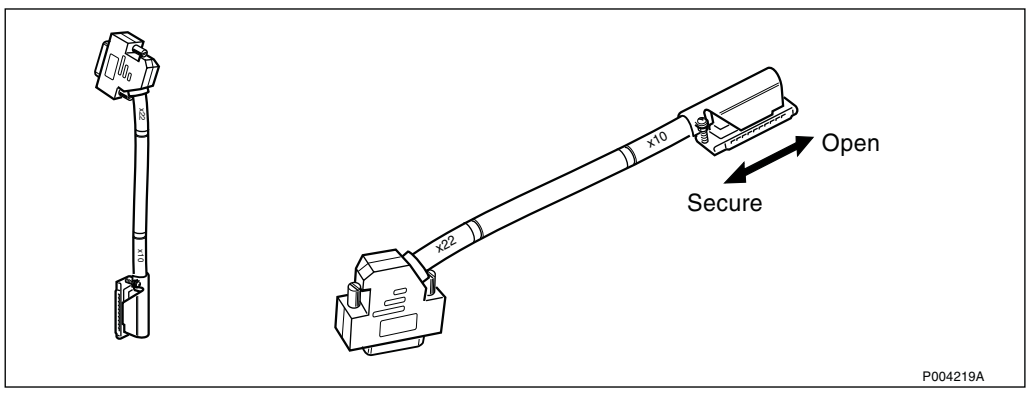

Figure 315 TXL cable

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3. Disconnect and remove the internal transmission cable, the internal AC cable and the TXL cable.

Note: The internal transmission cable is secured with slide latches. The TXL cable is secured on one end with slide latches and on the other with locking screws. Open the latches and the locking screws before removing the cables.

4. Connect the new cables, *see Figure 312 on page 375*.

Note: Make sure that the correct end of the internal transmission cable is mounted to the cabinet.

5. Remount the outer protective cover.

Set to operation

1. Turn the AC Mains Power switch to ON position.

If the PBC is not used, proceed to *step 4 on page 377*.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.5.10 Radio Cabinet

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 8 on page 377*.

6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the Radio cabinet

1. Make sure that none of the LEDs are lit inside the installation box.

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2. Remove the front, lower, left and upper sunshields.

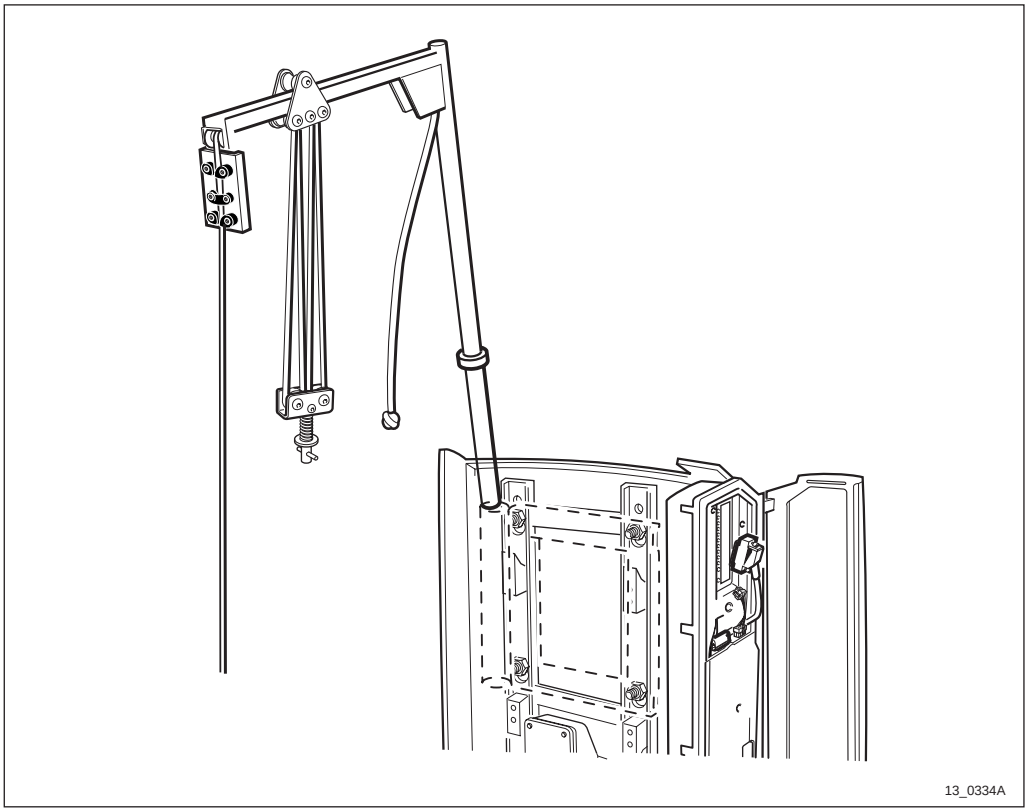

Figure 316 Lifting device

Note: The lifting device is optional.

3. Mount the lifting device (if it is to be used) on the left side of the mounting plate.

Note: For information regarding the use of the lifting device, *see chapter Installation of RBS 2302*.

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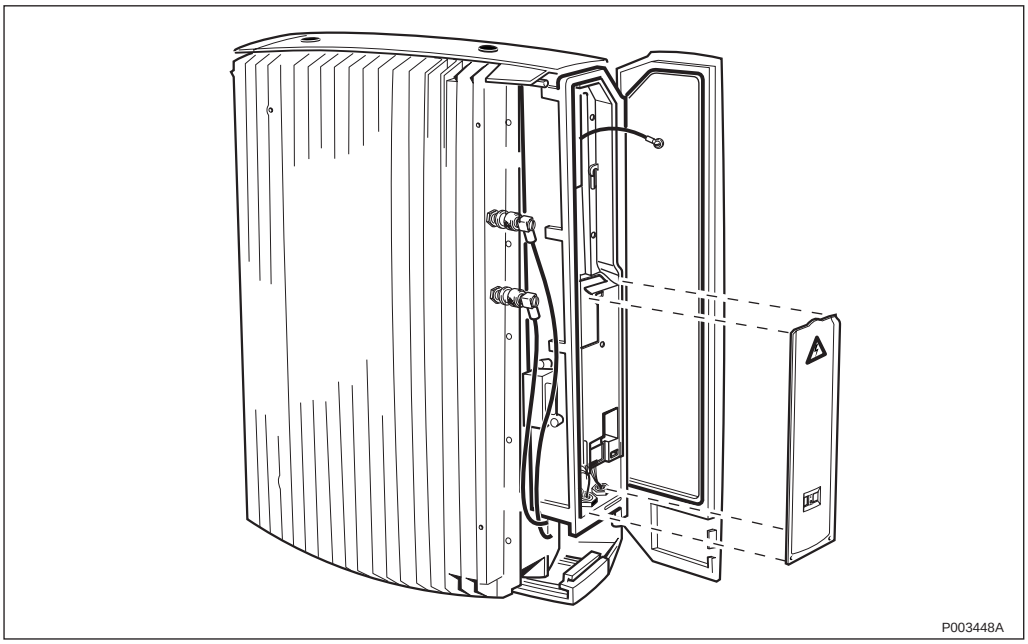

Figure 317 Outer protective cover

4. Unsnap the outer protective cover in the installation box and remove it.

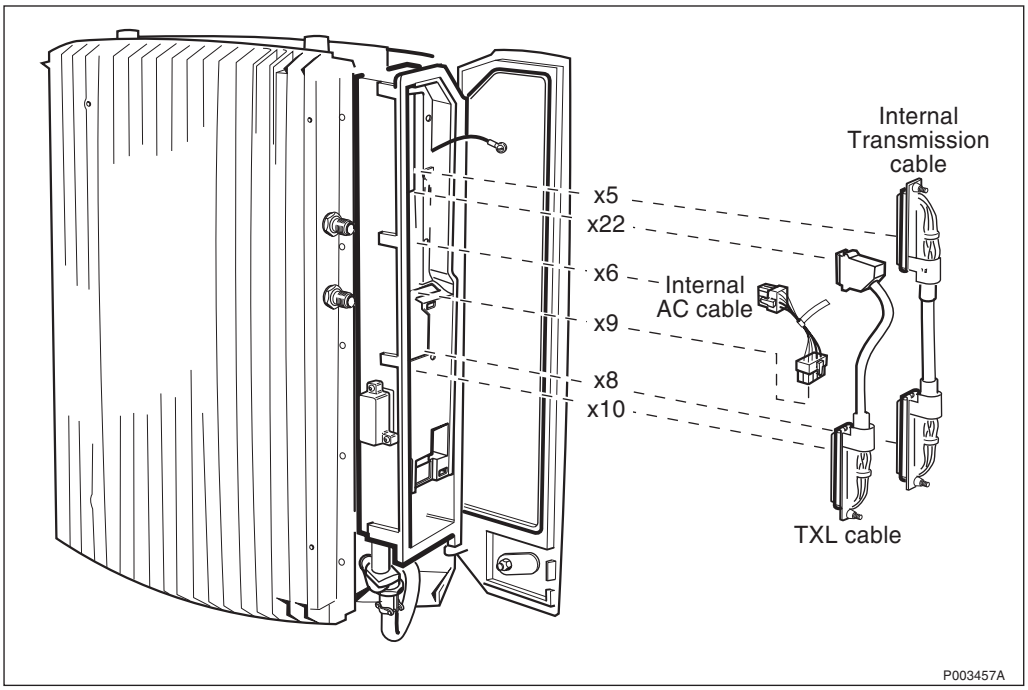

Figure 318 Internal cables

5. Disconnect the internal AC cable, the internal transmission cable and the TXL cable.

Note: The internal transmission cable is secured with slide latches. The TXL cable is secured on one end with slide latches and on the other with locking screws. Open the latches and the locking screws before removing the cables.

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6. Remove the inner protective cover.

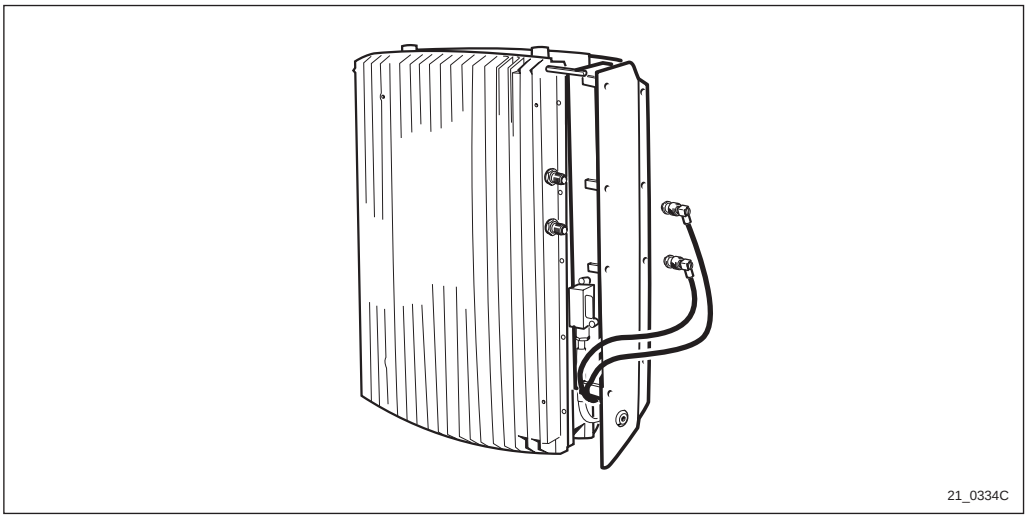

Figure 319 Disconnecting the Antenna cables

Note: Make sure that all cables are properly labelled before disconnecting them.

7. If an external antenna is used, disconnect the antenna cables from the radio cabinet.

   If a multicasting box is mounted under the radio cabinet, remove the box from the radio cabinet according to *Section 12.5.7 on page 371*.

   If an omnidirectional antenna is mounted under the radio cabinet, remove the antenna according to *Section Replacing the Omnidirectional Antenna on page 369*.

   If a sector antenna is mounted on the radio cabinet, remove it according to *Section Replacing the Sector Antenna on page 368*.

8. Remove the battery, *see page 373*.

9. If the optional PBC is used, remove the PSA according to *Section 12.5.11 on page 383*

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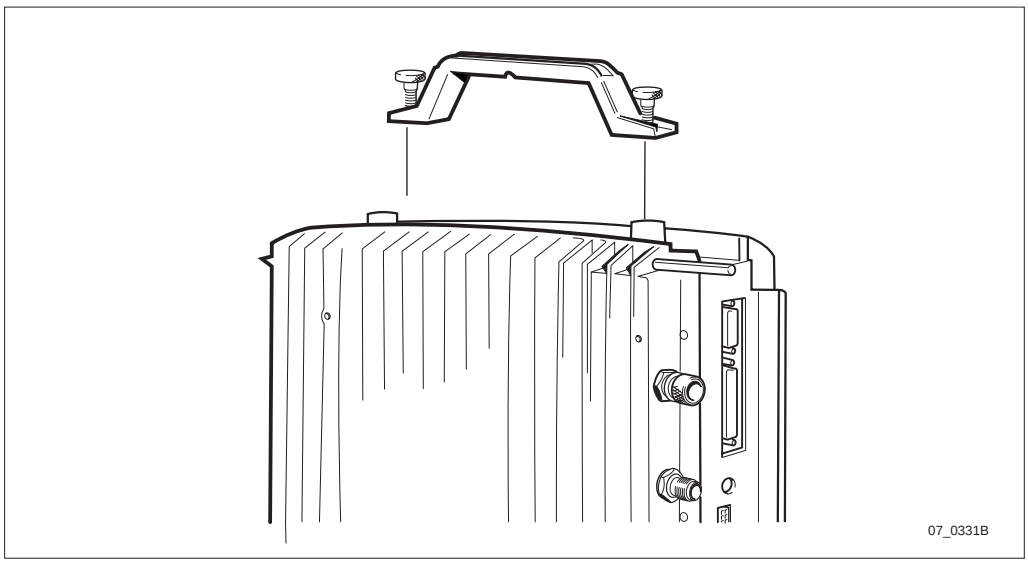

Figure 320 Mounting the handle

10. If the lifting device is used, attach the handle to the cabinet.

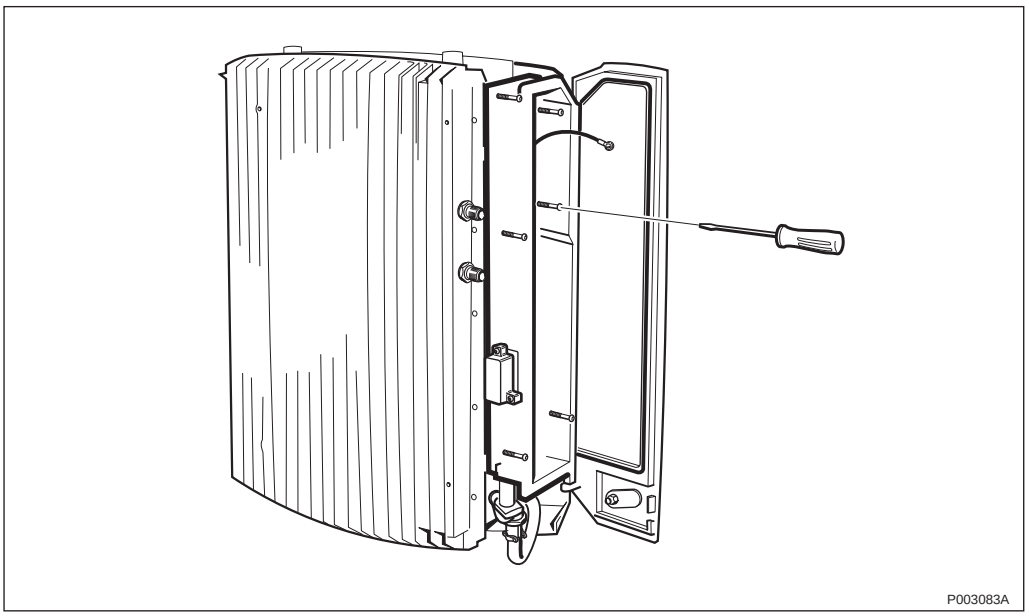

Figure 321 Loosening the installation box

11. Unscrew the six torx screws in the installation box.

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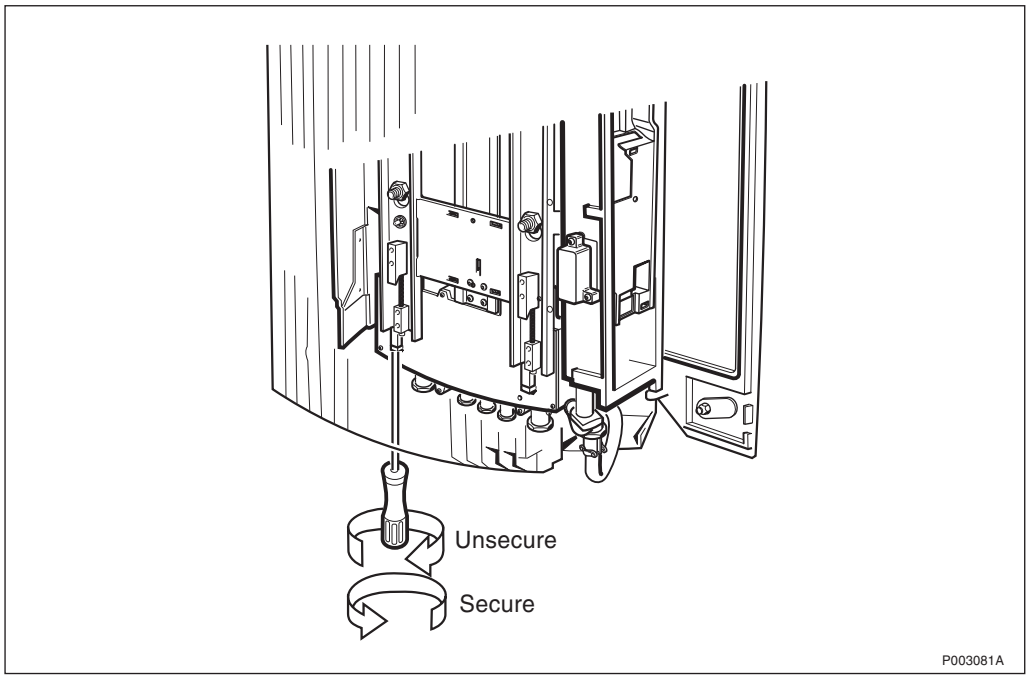

Figure 322 Unscrewing the locking device

12. Unscrew the locking device under/behind the radio cabinet by turning the 2 torx screws counterclockwise until they stop.

Note: Sometimes the two locking parts are jammed together causing the screw to move downwards instead of the wedge part moving up. This is solved simply by striking the back of the torx screwdriver with the hand, when the screw has been screwed down approximately 20 mm.

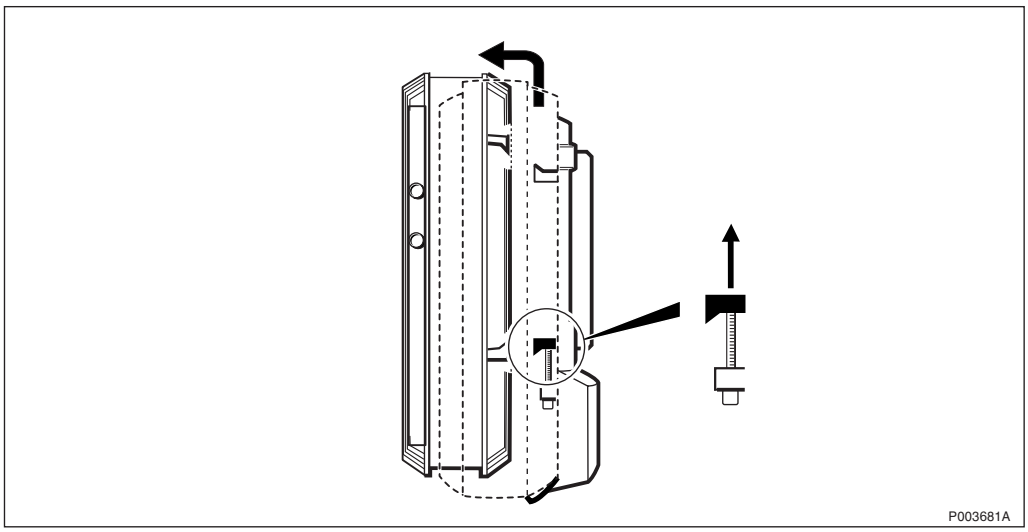

Figure 323 Unhooking the radio cabinet

13. Grip the bottom of the radio cabinet and pull it outwards.

14. Unhook the RBS by lifting the RBS upwards.

15. For information on how to mount the new radio cabinet, *see chapter Installation of RBS 2302*.

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16. Remount the battery or the PSA.

Set to Operation

1. Turn the AC Mains Power switch to ON position.

If the PBC is not used, proceed to *step 4 on page 383*.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC Battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the Battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.

Test after corrective action

1. Perform a MS call test to verify the function, *see chapter Optional Tests*.
2. Perform the checklist in *Section 12.9 on page 452*.

12.5.11 PSA

Prior to Replacement

1. Open the RBS installation box door.
2. Set the RBS to Local Mode.
3. Switch the RBS Battery switch to the OFF position.
4. Switch the RBS AC switch to the OFF position.
5. Switch the PBC Battery switch to OFF position.
6. Switch the PBC AC switch to OFF position.
7. Switch off the AC Mains Power switch.

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Replacing the PSA

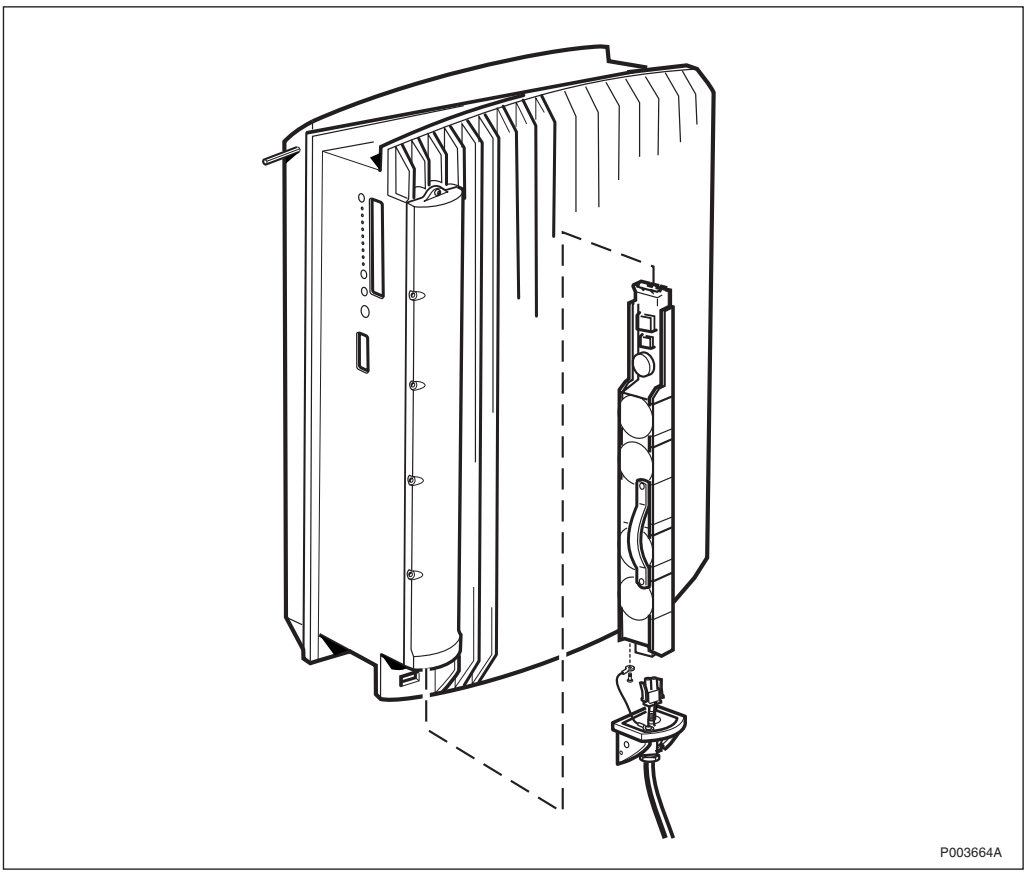

Figure 324 Replacing the PSA

1. Open the internal RBS battery compartment door by unscrewing the torx screw located on the cover.
2. Remove the faulty PSA.
3. Separate the cover from the PSA on both the faulty and new units by loosening the torx screw that hold the wire and disconnect the cables.
4. Mount the old cover on the new PSA and connect the cable.
5. Mount the wire between the cover and the new PSA with the torx screw.
6. Insert the new PSA into the battery compartment.
7. Tighten the torx screw and make sure there is no gap between the cover and the radio cabinet.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.

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5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform a battery backup test, *see chapter RBS Site Integration*.
2. Perform the checklist in *Section 12.9 on page 452*.

12.5.12 Fuses

Prior to Replacement

1. Open the installation box door.
2. Switch the RBS battery switch to the OFF position.
3. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 6 on page 385*.

4. Switch the PBC battery switch to OFF position.
5. Switch the PBC AC switch to OFF position.
6. Switch off the AC Mains Power switch.

Replacing the fuses

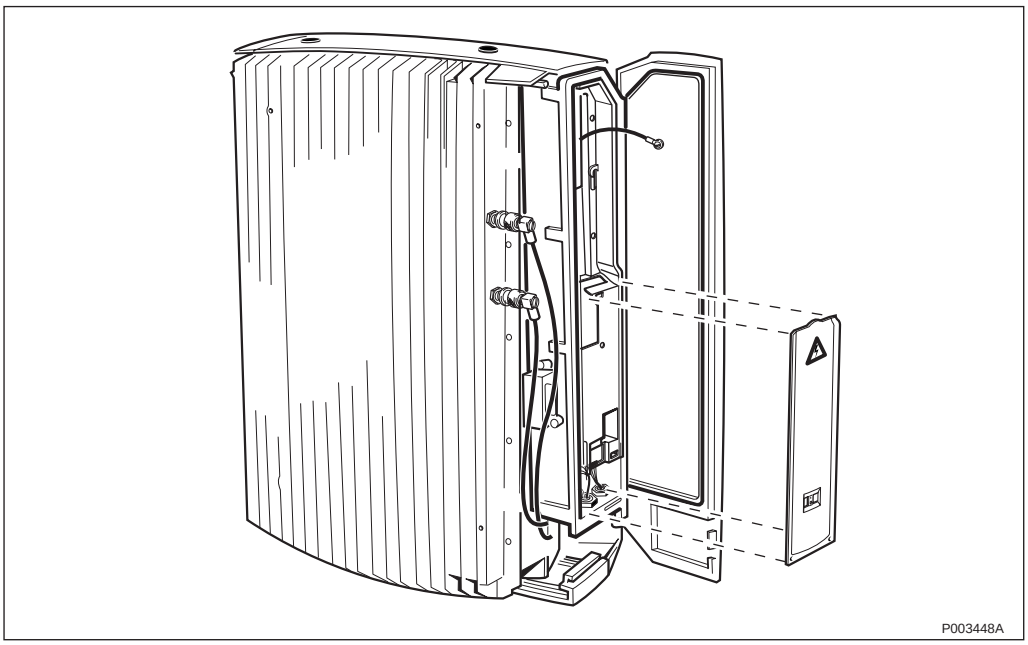

Figure 325 Removing the outer protective cover

1. Remove the outer protection cover by snapping it off, and let the cover hang in its cord.

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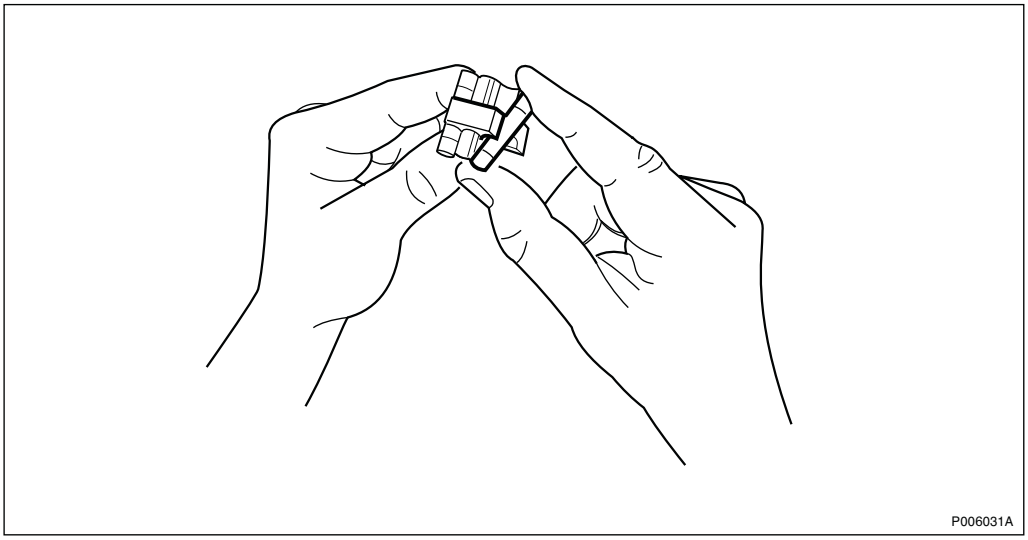

Figure 326 Snapping the fuses into position

2. Remove the fuseholder and replace the faulty fuses with new fuses. Make sure that the correct fuses are used, *see table below*.

Table 66 Fuses

Voltage	Fuses Data	Dimension
100-127 V AC	Ceramic Slow Blow 8 AT, 250 V (1)	6.3x32 mm
200-250 V AC	Ceramic Slow Blow 6.3 AT, 250 V (1)	5x20 mm

(1) Fuse according to standard EN 60127.

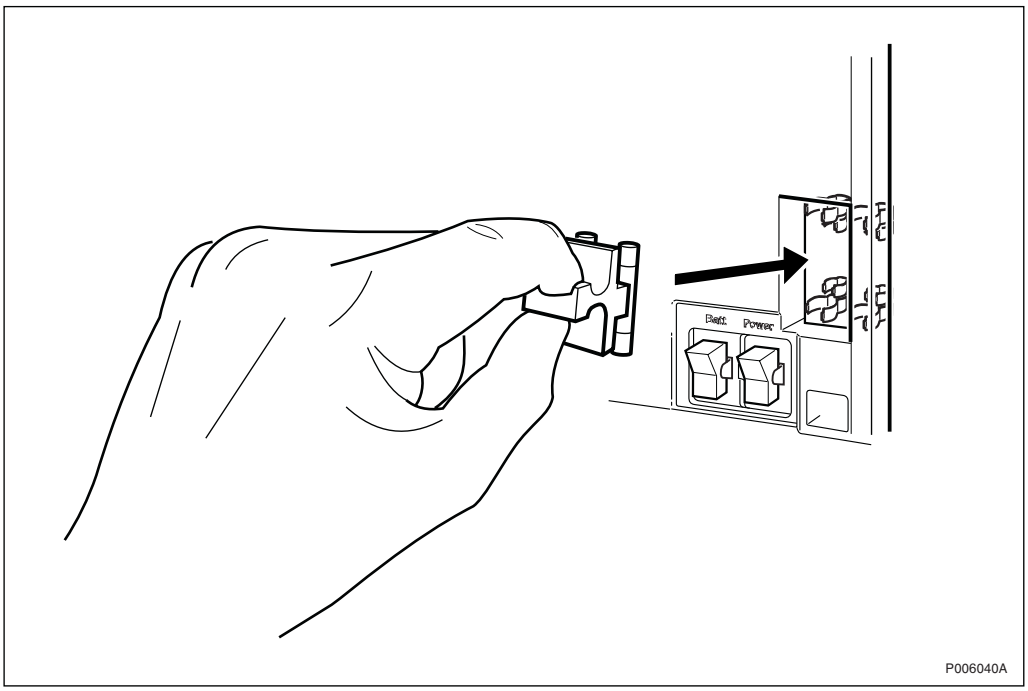

Figure 327 Snapping the fuseholder into position

3. Snap the fuseholder back into position.
4. Remount the outer protection cover.

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Set to operation

1. Turn the AC Mains Power switch to ON position.

If the PBC is not used, proceed to *step 4 on page 387*.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.5.13 Connection Board

Prior to Replacement

1. Open the installation box door on the radio cabinet.
2. Switch the RBS battery switch to the OFF position.
3. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 6 on page 387*.

4. Switch the PBC battery switch to OFF position.
5. Switch the PBC AC switch to OFF position.
6. Switch off the AC Mains Power switch.

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Replacing the connection board

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

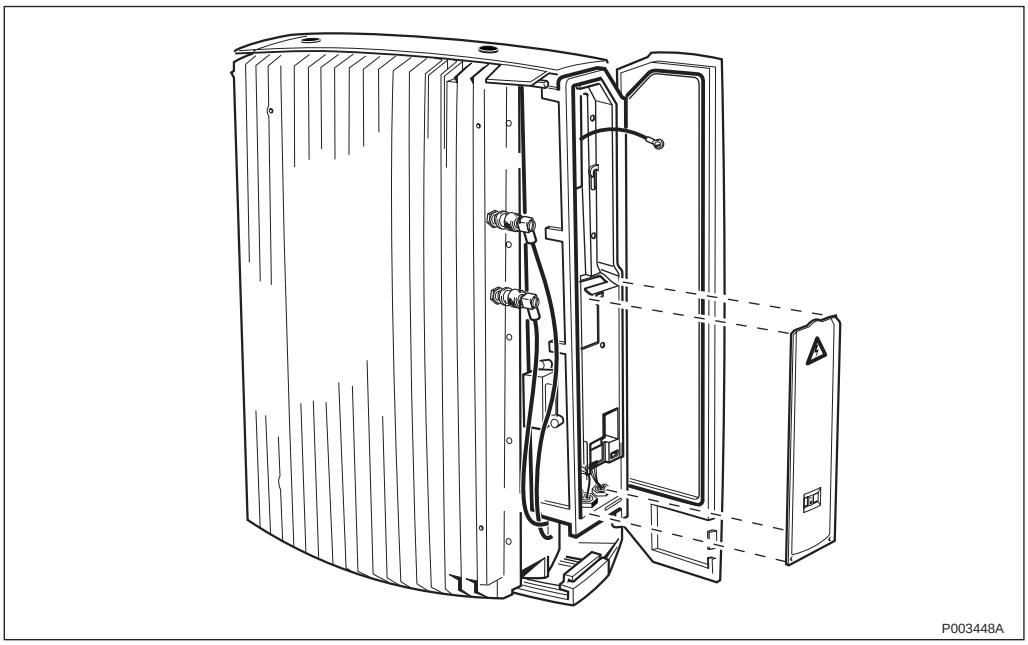

Figure 328 Removing the outer protective cover

1. Remove the outer protective cover by unsnapping it.

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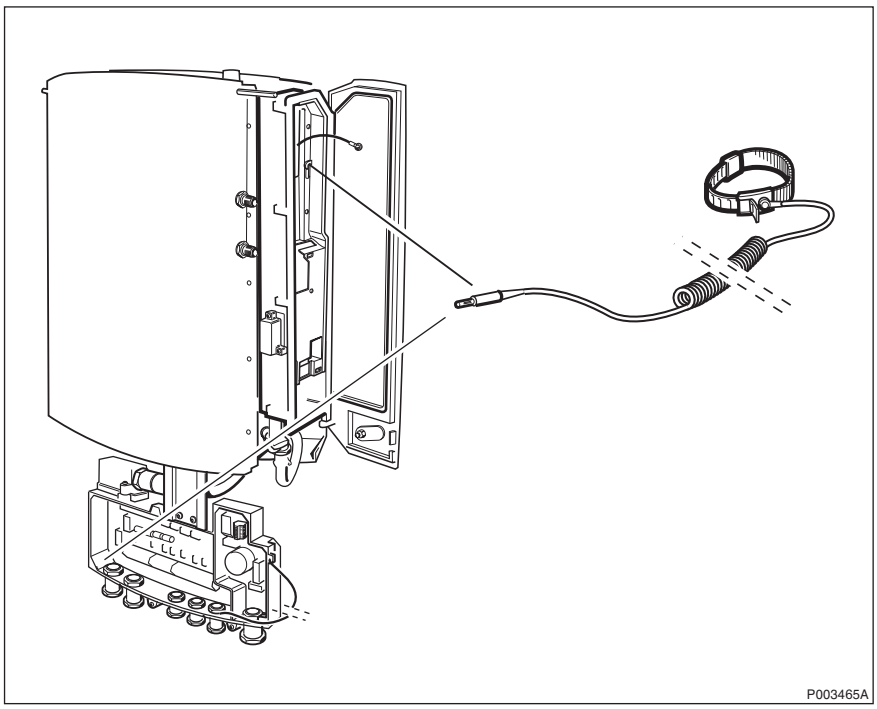

Figure 329 Connecting the ESD wrist strap

2. Connect the ESD wrist strap to the ESD connection point in the installation box.

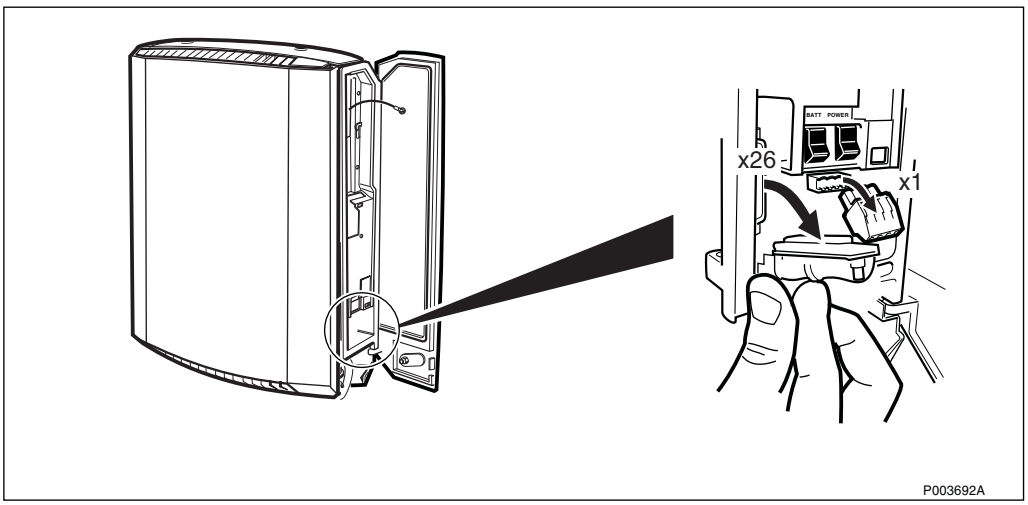

Figure 330 Disconnecting the transmission cable and AC cable

3. Disconnect the transmission cable and the AC cable from the interface box.

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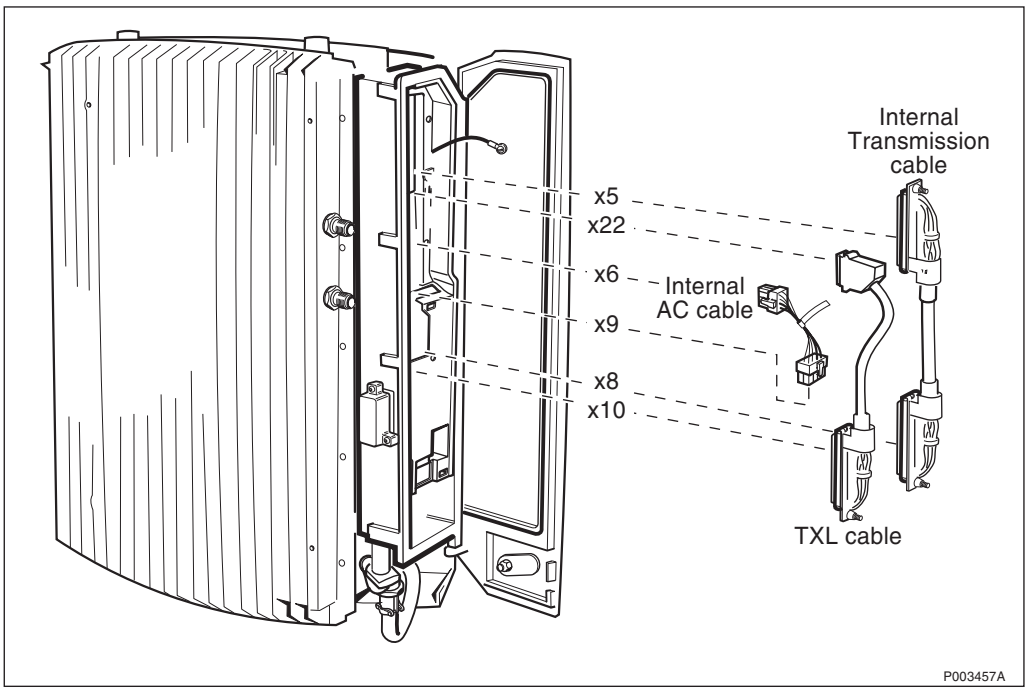

Figure 331 Disconnecting internal cables

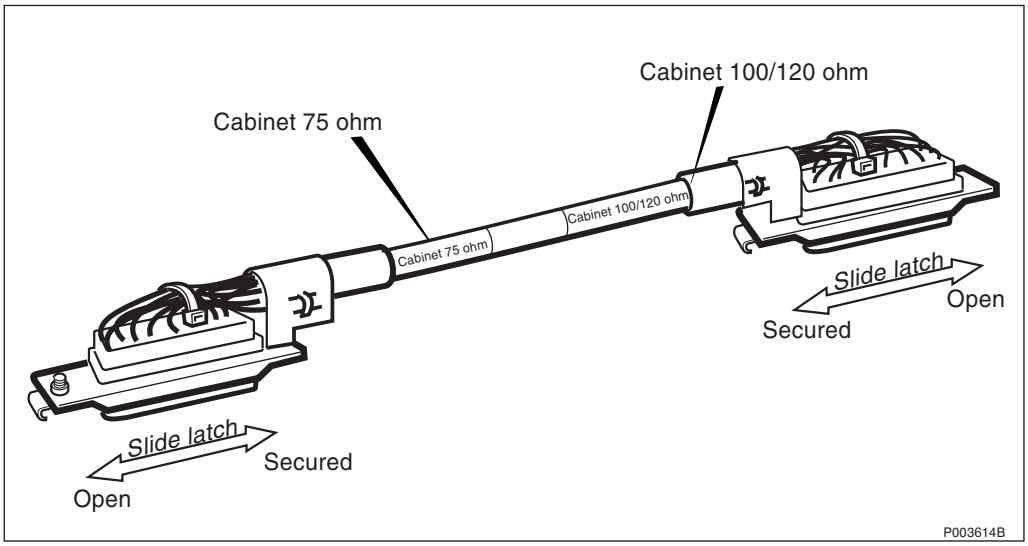

Figure 332 Internal transmission cable

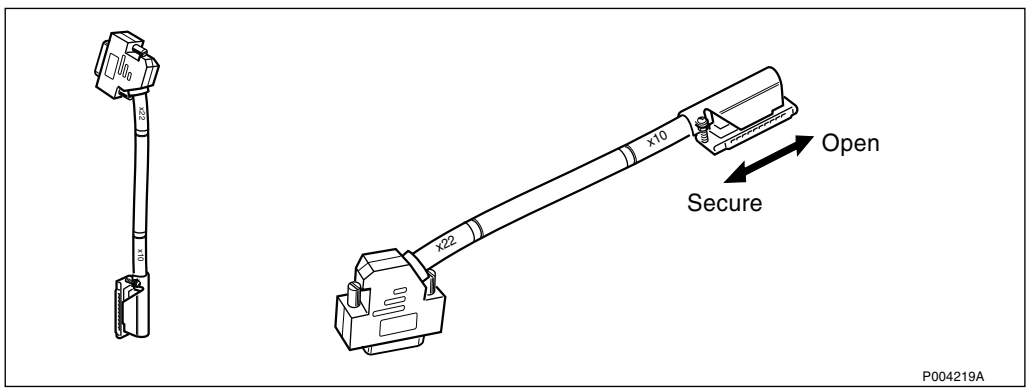

Figure 333 TXL cable

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4. Disconnect the internal AC cable, the internal transmission cable and the TXL cable.

Note: The internal transmission cable is secured with slide latches. The TXL cable is secured on one end with slide latches and on the other with locking screws. Open the latches and the locking screws before removing the cables.

5. Remove the fuseholder including the fuses.

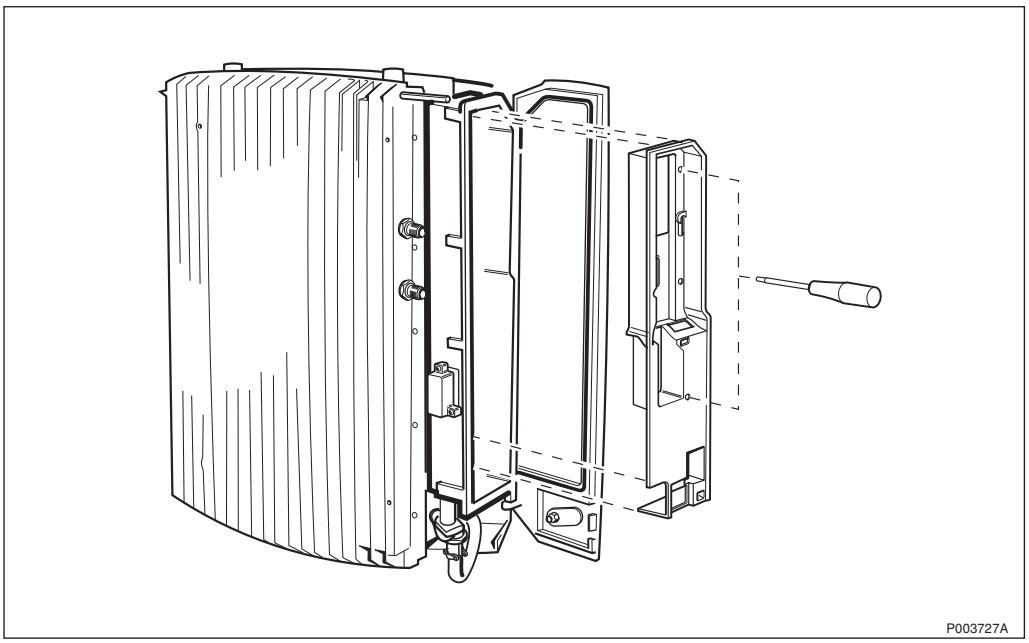

Figure 334 Removing the inner protective cover

6. Remove the inner protective cover by unscrewing the two torx screws.

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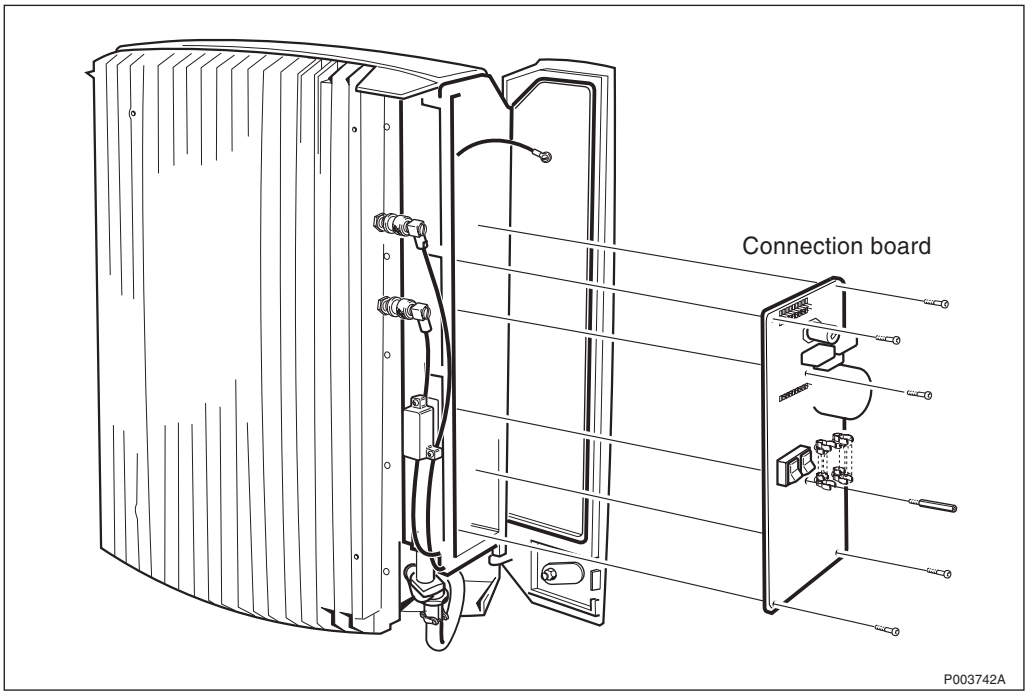

Figure 335 Removing the connection board

7. Unscrew the six screws and remove the connection board.
8. Mount the new board.
9. Make sure that the voltage selector is set for the correct voltage used at the site, and that appropriate fuses are mounted.
10. Mount the inner protective cover.
11. Remount the fuseholder..
12. Reconnect the internal AC cable, the internal transmission cable and the TXL cable.

Note: Make sure that the correct end of the internal transmission cable is mounted to the cabinet.

13. Reconnect the transmission cable and the AC cable to the interface box.
14. Remount the outer protective cover.

Set to operation

1. Turn the AC Mains Power switch to ON position.

If the PBC is not used, proceed to *step 4 on page 392*.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.

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7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.5.14 Transmission Board

Prior to replacement

1. Open the installation box door.
2. Set the RBS to Local Mode.
3. Switch the RBS battery switch to the OFF position.
4. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 7 on page 393*.

5. Switch the PBC battery switch to OFF position.
6. Switch the PBC AC switch to OFF position.
7. Switch off the AC Mains Power switch.

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Replacing the transmission board

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

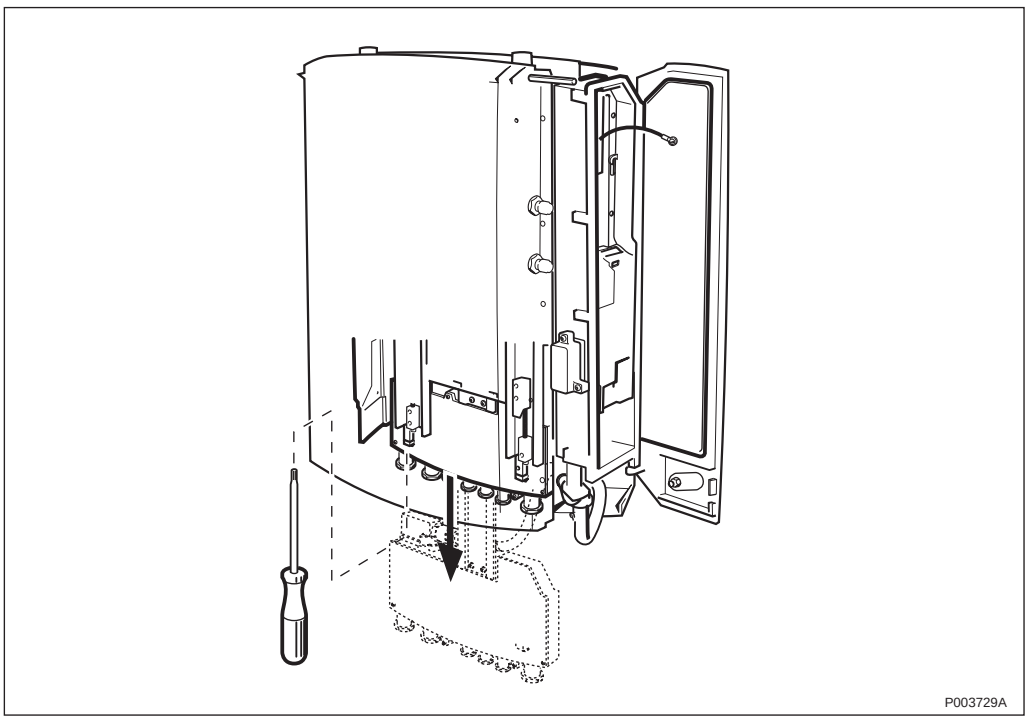

Figure 336 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

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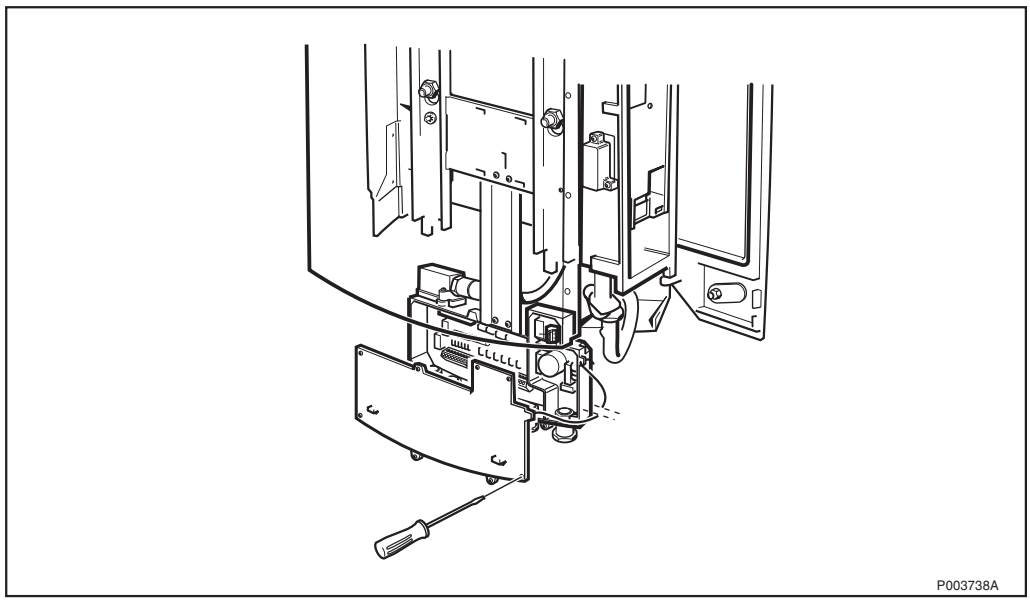

Figure 337 Loosening the interface box cover

2. Open the cover of the interface box by loosening the 8 torx screws.

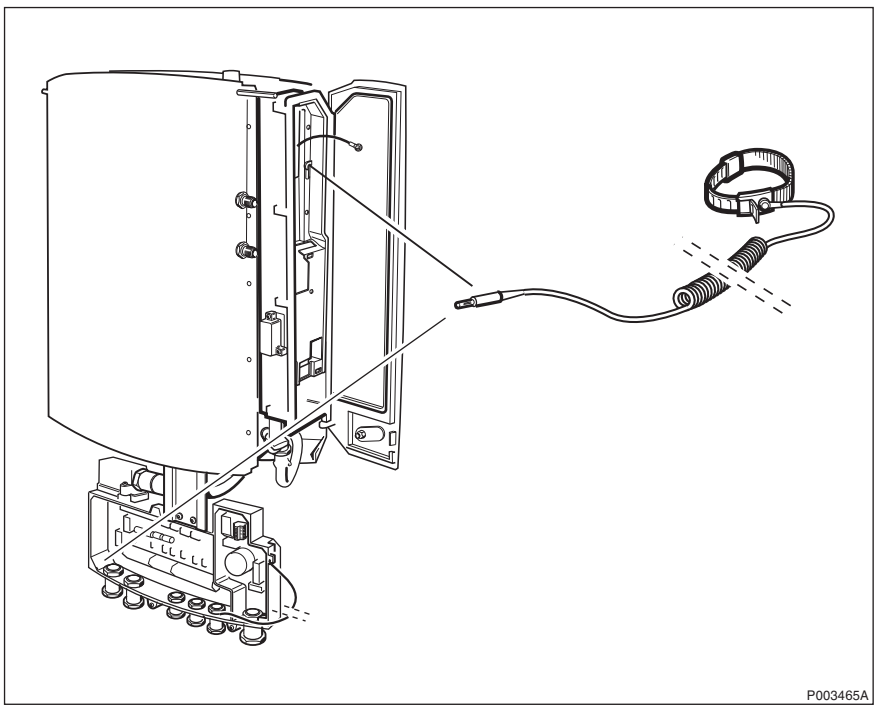

Figure 338 Connecting the ESD wrist strap

3. Connect the ESD wrist strap to the ESD connection point in the installation box.

Note: You have ten seconds to perform *step 4 on page 396*to maintain the PCM link between the BSC and the other RBS that are cascade connected. This step is only valid when the PCM B is used in a cascade connection.

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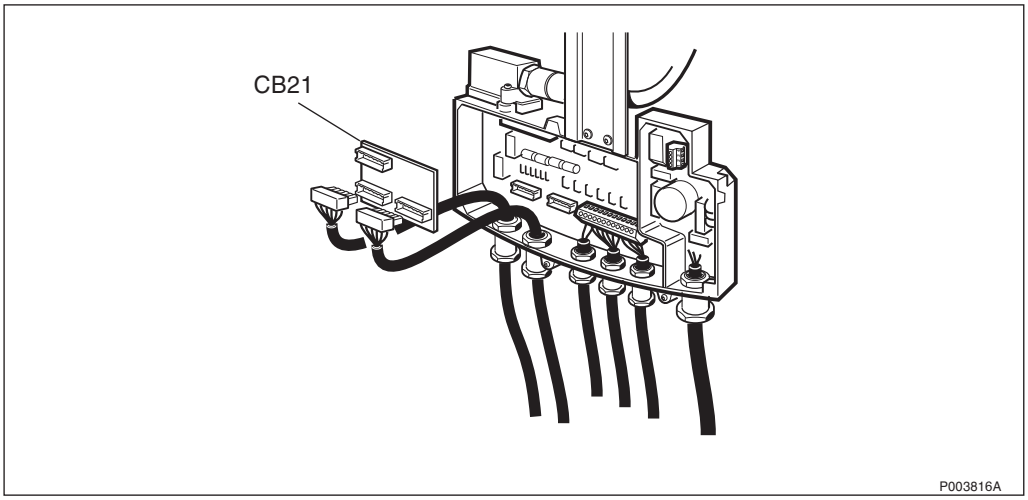

Figure 339 Mounting the CB21 connection board

4. Remove the connection terminal blocks for the PCM-lines and mount the connection board CB21 on the two PCM terminal blocks.
5. Remove all remaining connection terminal blocks connected, except for the AC terminal block.
6. Loosen the two screws holding the transmission connector located at the top left of the interface box.
7. Remove the connector.

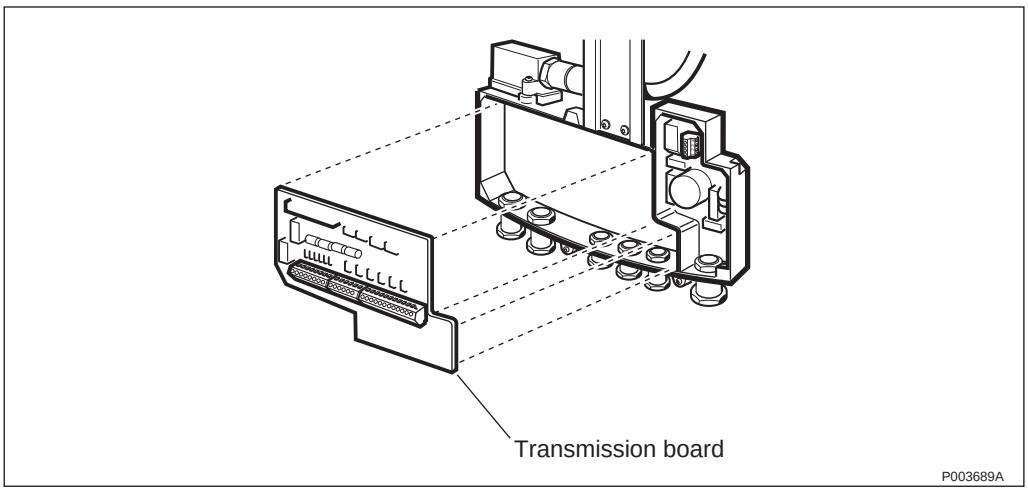

Figure 340 Loosening the transmission board

8. Unscrew all six screws holding the transmission board and remove the transmission board.
9. Mount the new transmission board and tighten the screws.
10. Connect the transmission connector located on top of the interface box, and tighten the screws.
11. Connect all the connection terminal blocks, except for the PCM lines.

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Note: You have ten seconds to reinstall the PCM terminal blocks, *see step 12 on page 397*.

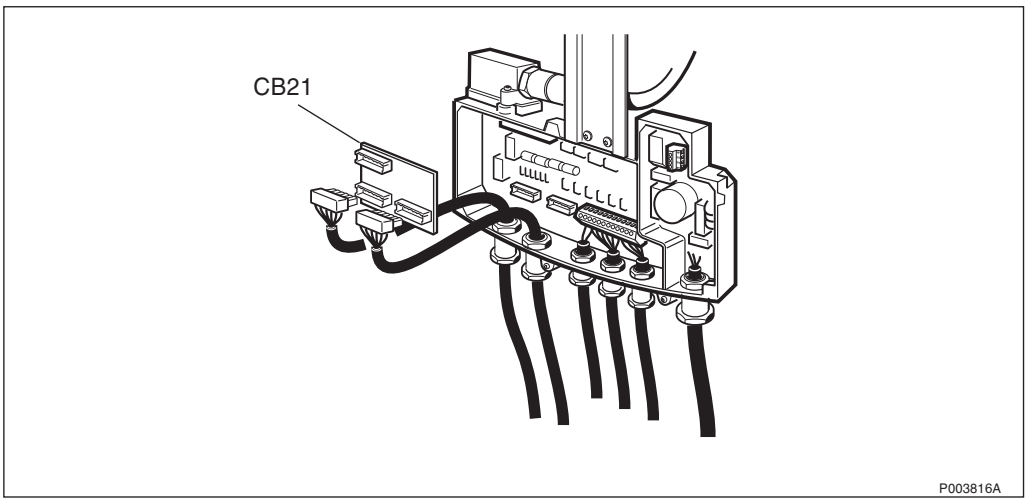

Figure 341 Dismounting the CB21 contact

12. Disconnect the connection board CB21 and remount the connection terminal block for the PCM line on the transmission board.
13. Remove the ESD wrist strap.
14. Remount the cover of the interface box and tighten the screws.
15. Push up the interface box and secure it in the upper position with the two torx screws.

Set to Operation

1. Turn the AC Mains Power switch to ON position.

If the PBC is not used, proceed to *step 4 on page 397*.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.5.15 AC Board

Prior to Replacement

1. Open the installation box door.

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2. Set the RBS to Local Mode.
3. Switch the RBS battery switch to the OFF position.
4. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 7 on page 398*.

5. Switch the PBC battery switch to OFF position.
6. Switch the PBC AC switch to OFF position.
7. Switch off the AC Mains Power switch.

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Replacing the AC board

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

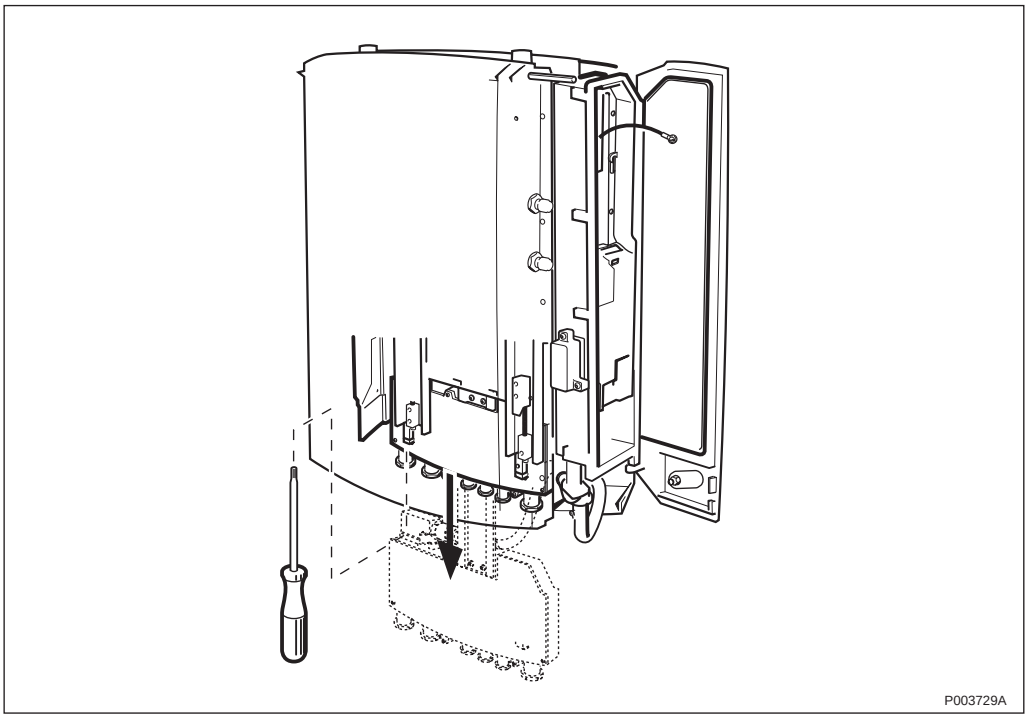

Figure 342 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

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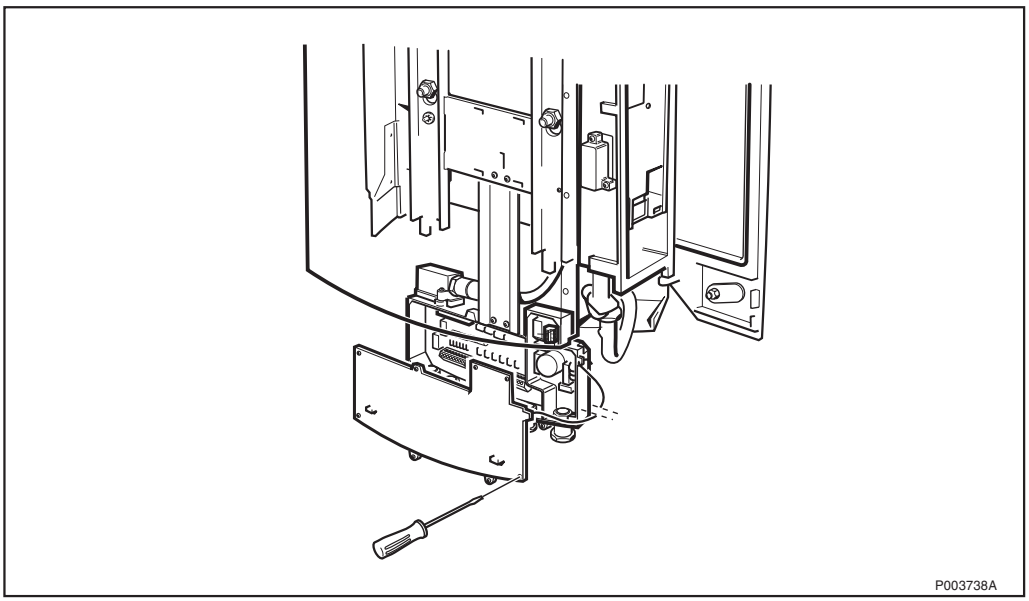

Figure 343 Loosening the interface box cover

2. Open the cover of the interface box by loosening the 8 torx screws.

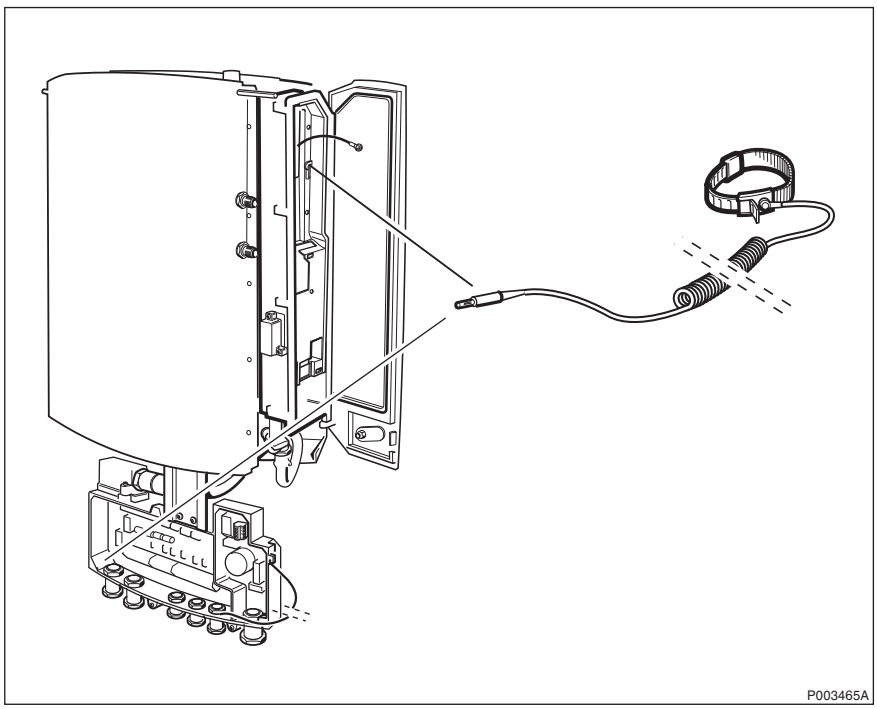

Figure 344 Connecting the ESD wrist strap

3. Connect the ESD wrist strap to the ESD connection point in the installation box.
4. Remove the pull-relief clamp of the incoming AC cable.
5. Remove the connection terminal blocks connected to the AC board.

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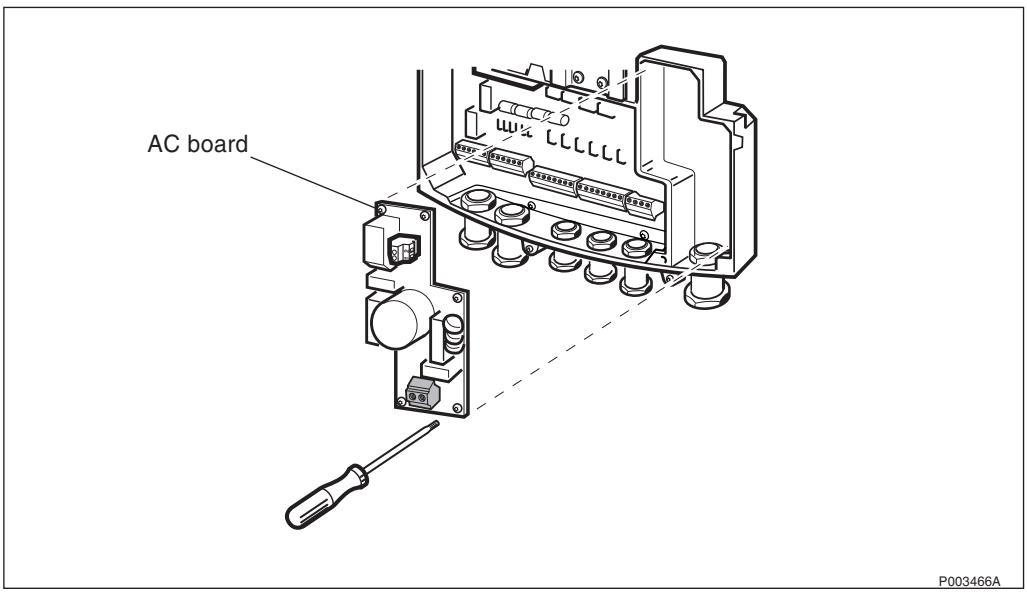

Figure 345 Removing the AC board

6. Unscrew the six torx screws holding the AC board and remove the AC board.
7. Replace the AC board and remount the six screws, including the Protective Earth. Tighten the screws.
8. Remount the two AC connection terminal blocks.
9. Remount the pull-relief clamp of the incoming AC cable.
10. Remove the ESD wrist strap.
11. Remount the cover of the interface box and tighten the screws.
12. Push up the interface box and secure it in the upper position with the two torx screws.

Set to Operation

1. Turn the AC Mains Power switch to ON position.

If the PBC is not used, proceed to *step 4 on page 401*.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

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12.5.16 Mounting Base

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.

If the PBC is not used, proceed to *step 8 on page 402*.

6. Switch the PBC battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the mounting base

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

1. Remove the sunshields.
2. Remove the radio cabinet, *see page 377*.

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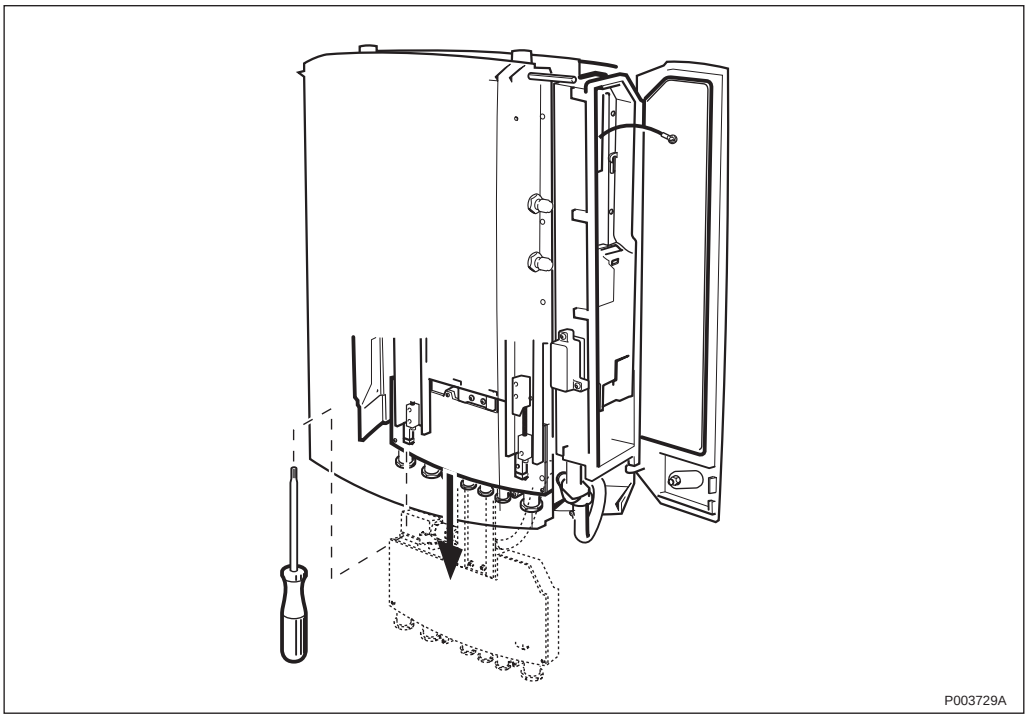

Figure 346 Loosening the interface box

3. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.
4. Open the cover of the interface box by loosening the 8 torx screws.

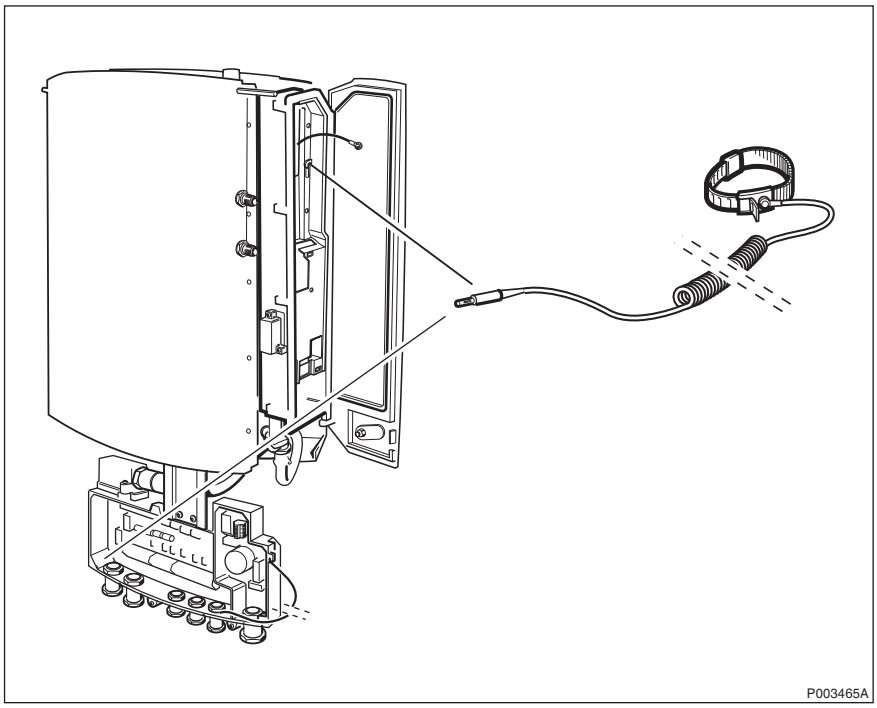

Figure 347 Connecting the ESD wrist strap

5. Connect the ESD wrist strap to the ESD connection point in the installation box.

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Note: You have ten seconds to perform *step 6 on page 404*to maintain the PCM link between the BSC and the other RBS that are cascade connected. This step is only valid when the PCM B is used in a cascade connection.

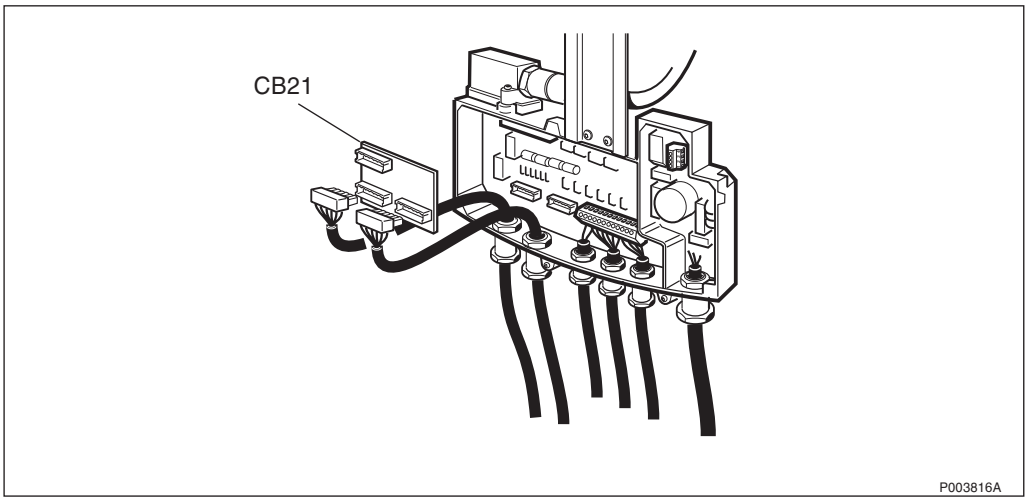

Figure 348 Mounting the CB21 connection board

6. Remove the connection terminal blocks for the PCM-lines and mount the connection board CB21 on the two PCM terminal blocks.

7. Remove all remaining terminal blocks, including the AC terminal block.

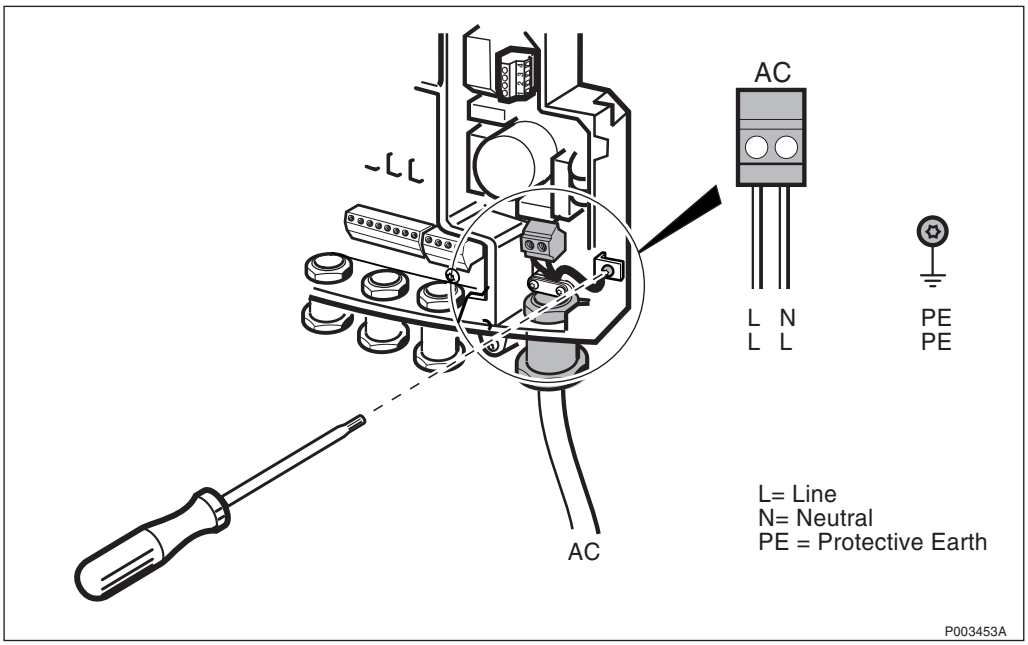

Figure 349 Loosening the Protective Earth in the AC section of the interface box

8. Loosen the Protective Earth in the AC section of the interface box.

9. Loosen the two screws on the AC pull-relief clamp.

10. Dismount the cable gland.

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11. Pull out the AC cable.

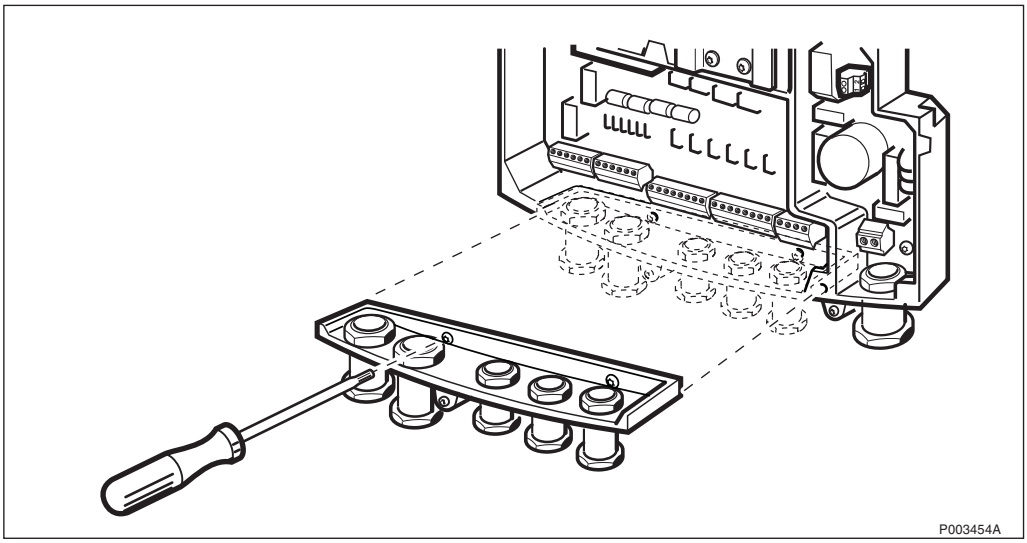

Figure 350 Loosening the gland plate

12. Remove the gland plate by loosening the two torx screws.

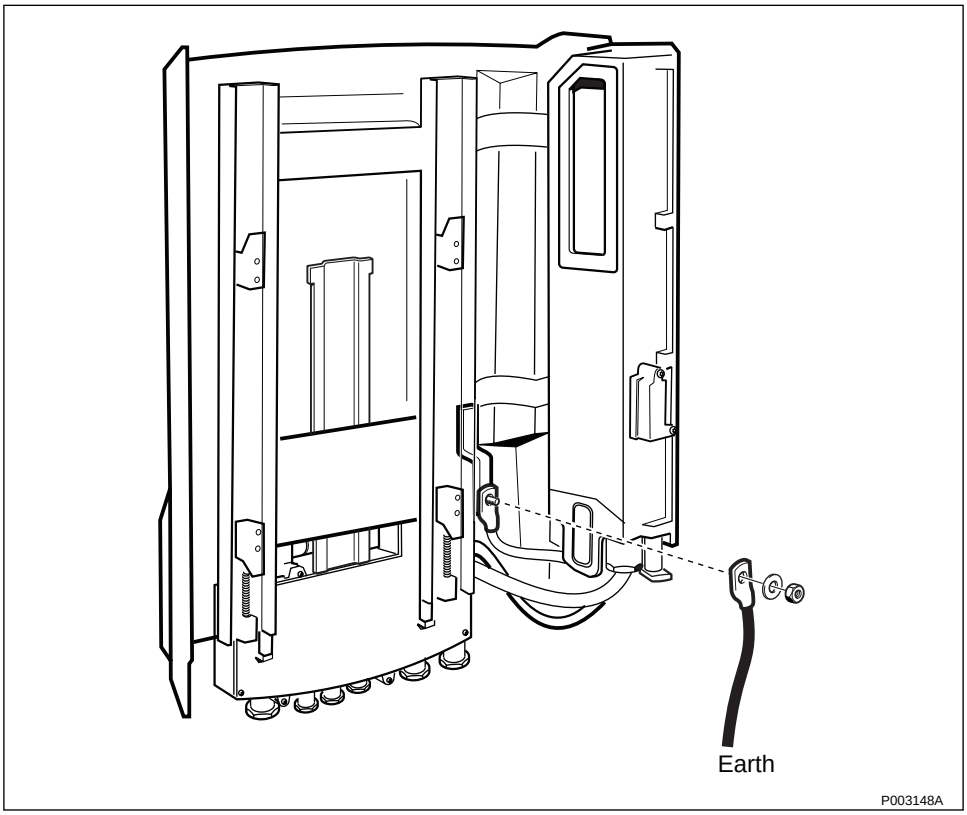

Figure 351 Remove the Earth Cable

13. Remove the earth cable on the mounting base.
14. Loosen the four nuts securing the mounting base.
15. Lift up the mounting base and pull it away from the wall bracket.
16. Place the mounting base on the ground.

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17. Loosen the gland plate of the new cabinet by loosening the two torx screws.
18. Mount the new mounting base on the mounting plate.
19. Tighten the four nuts holding the mounting base.
20. Reconnect the earth cable to the mounting base.
21. Mount the old gland plate.
22. Insert the AC cable and connect the Protective Earth.

Note: You have ten seconds to reinstall the PCM terminal blocks, *see step 23 on page 406*.

23. Disconnect the connection board CB21 and remount the connection terminal blocks for the PCM line on the transmission board.
24. Remount the remaining connection terminal blocks.
25. Remount the cover of the interface box and tighten the screws.
26. Push up the interface box and secure it in the upper position with the two torx screws.
27. To remount the cabinet on the mounting base, *see chapter Installation of RBS 2302*.

Set to Operation

1. Turn the AC Mains Power switch to ON position.

If the PBC is not used, proceed to *step 4 on page 406*.

2. Switch the PBC AC switch to ON position.
3. Switch the PBC Battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the Battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Perform a MS call test to verify the function, *see chapter Optional Tests*.
2. Perform the checklist in *Section 12.9 on page 452*.

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12.5.17 Internal Synchronization (Calibrate Oscillator)

Fault Localisation

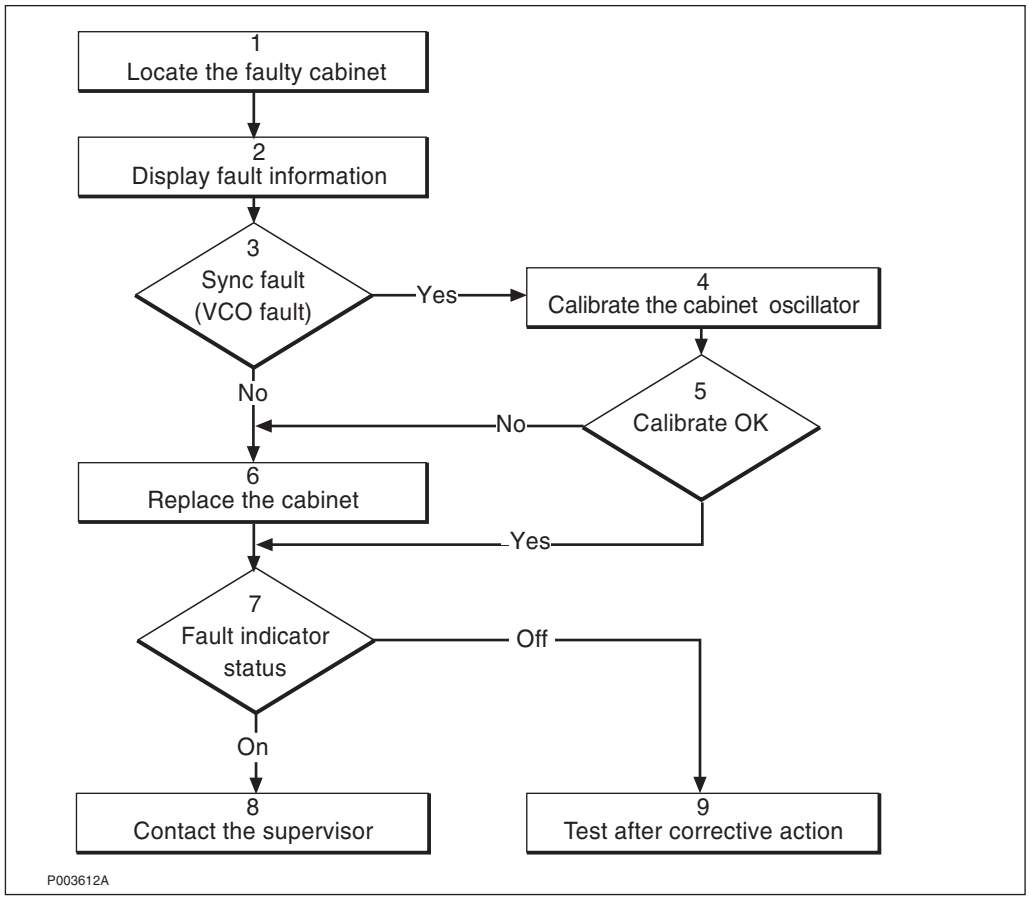

Figure 352 Internal Synchronization fault localization

1. Locate the faulty Radio cabinet

   Locate the faulty Radio cabinet according to the work order information.

2. Display fault information

   The fault status of RBS can be determined in two ways:

   •The red LED indicator labelled *Fault* on the DP, indicates that one or more faults have been detected in the radio cabinet.

   •Use OMT to display faults in the RBS. Use OMT to monitor the radio cabinet. For more information on the use of OMT, see:

   OMT User's Manual *LZN 302 01*

3. Sync Fault

   Is the alarm "Timing Unit VCO ageing" in the internal fault map class 2A or "Timing unit VCO fault" in the internal map class 1A?

4. Calibrate the cabinet oscillator

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Calibrate the optional reference oscillator according to instructions in *Section 12.7.7 on page 448*.

5. Replace the Cabinet

   Replace the radio cabinet according to instruction in *page 377*.

6. Calibration OK

   Is the calibration OK?

7. Fault indicator status

   The red LED indicator labelled *Fault* on the DP, indicates that one or more faults have been detected within the radio cabinet.

8. Contact the supervisor

   Contact the supervisor or manager who will take further action, such as consulting the FSC.

9. Test after corrective action

   Perform the recommended tests.

Replacing the cabinet

For information on how to replace the cabinet, *see page 377*.

Test after corrective action

1. If the calibration of the optional reference oscillator has been done, make an MS call test to verify the radio cabinet. *See chapter Optional Tests*.
2. If the cabinet has been replaced, perform all tests in *chapter Site Installation Tests* (except the Transmission Test), as well as the tests in *chapter Antenna System Tests*.
3. Perform the checklist in *Section 12.9 on page 452*.

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12.6 Corrective Action for the PBC

12.6.1 Sunshields

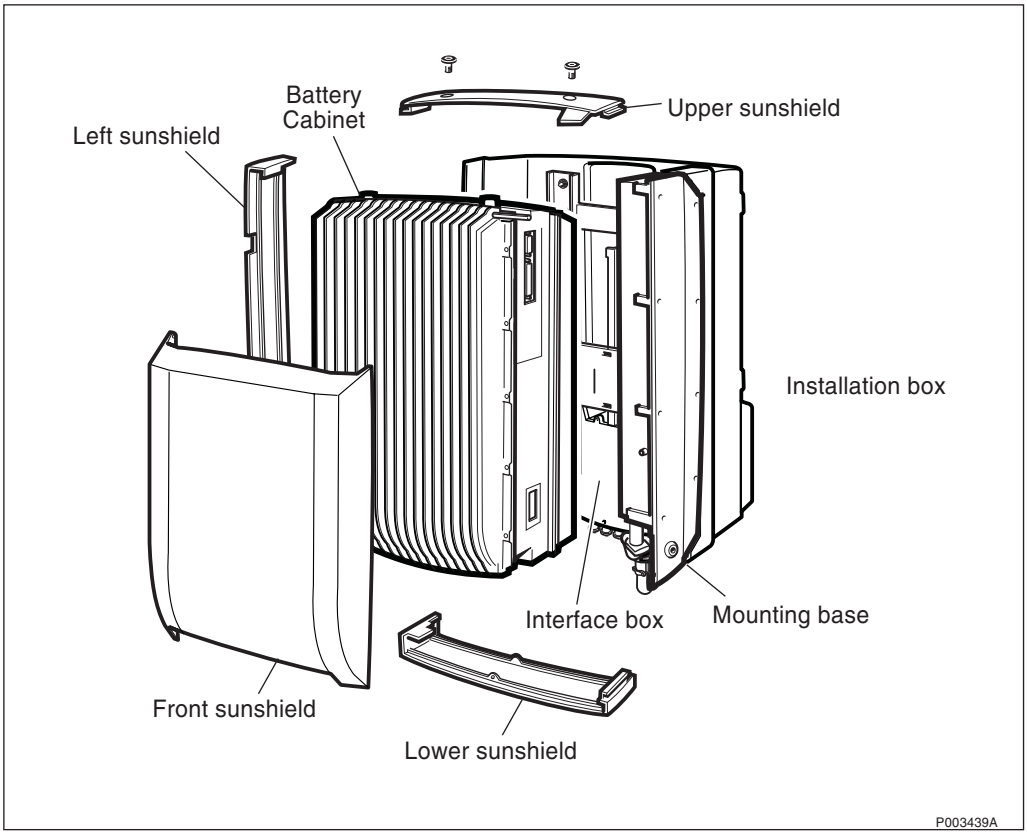

Figure 353 Sunshields overview

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Replacing the front sunshield

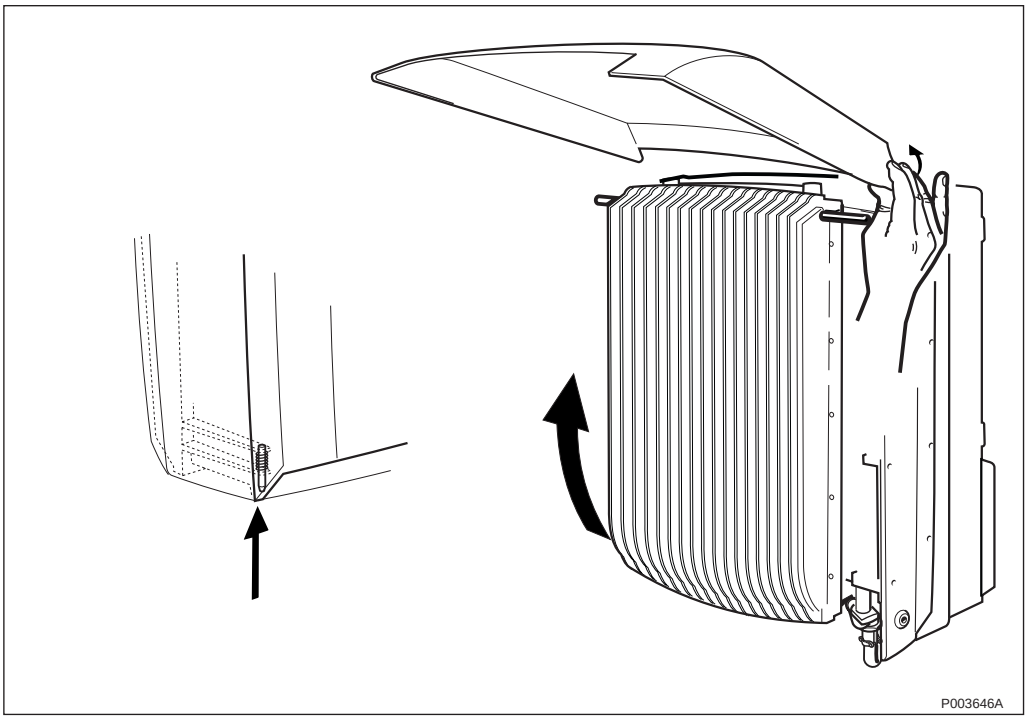

Figure 354 Replacing the front sunshield

1. Open the installation box door.
2. Push up the spring locking pin, located in the lower left hand corner.
3. Pull out the lower part of the cover.
4. Carefully bend out the sides at the top of the cover, so that the hinge snaps off and the cover can be removed.
5. Mount the new front sunshield.
6. Carefully bend out the sides on the top, so they can snap on to the hinge.
7. Fold down the cover.

Note: Make sure that no cables are bent or squeezed.

8. Press the lower left hand corner towards the battery cabinet, so that the spring locking pin snaps into position.
9. Close the installation box door.

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Replacing the lower sunshield

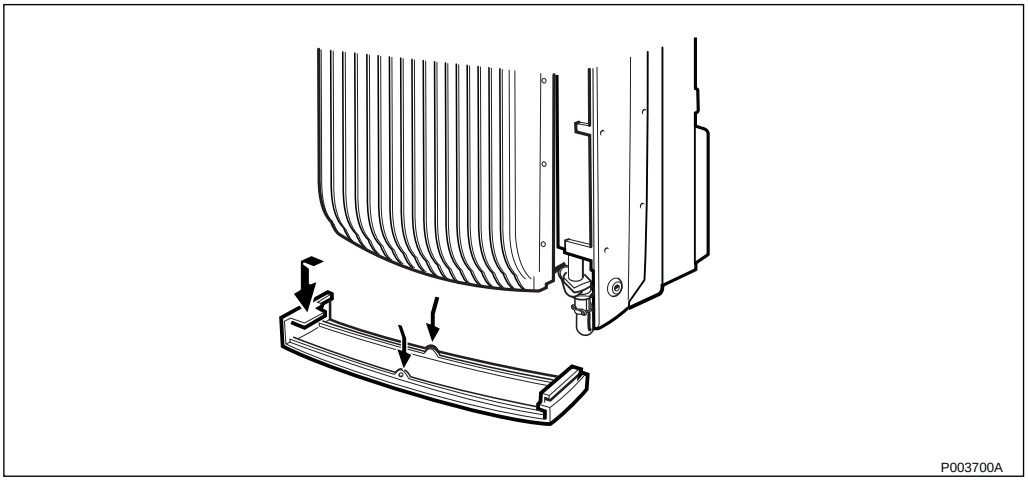

Figure 355 Replacing the lower sunshield

1. Open the installation box door.
2. Unsnap the sunshield by pressing the fasteners, located on the middle on the sunshield.
3. Pull the sunshield down and unhook it.
4. Mount the new sunshield in its cut-out in the left side of the PBC.
5. Snap the sunshield into position.
6. Close the installation box door.

Replacing the left sunshield

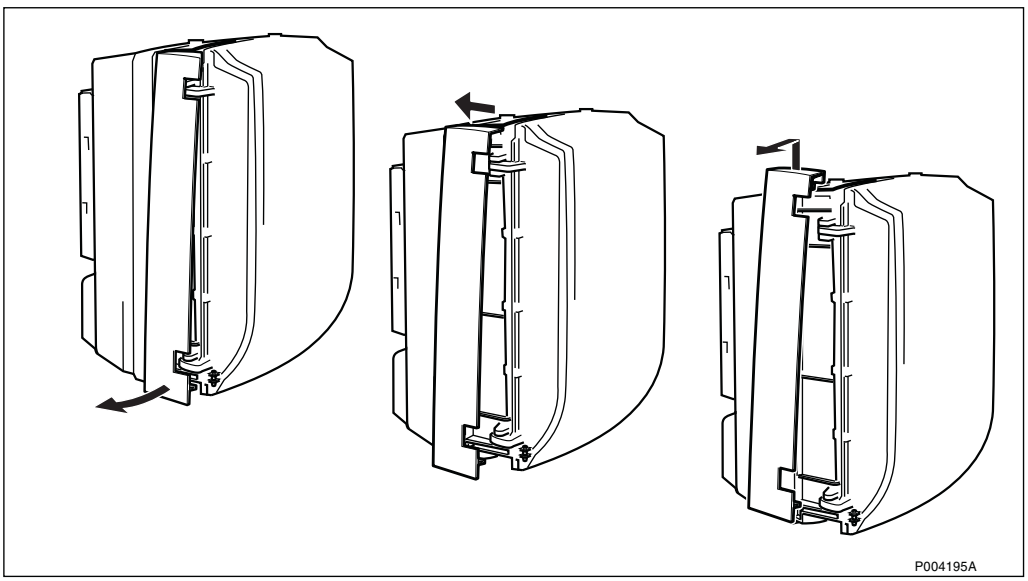

Figure 356 Replacing the left sunshield

1. Open the installation box door.
2. Remove the lower sunshield.

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3. Unsnap the lower part of the left sunshield, push it back so that it clears from the hinges and unhook the sunshield from the PBC.
4. Mount the new left sunshield.
5. Mount the lower sunshield.
6. Close the installation box door.

Replacing the upper sunshield

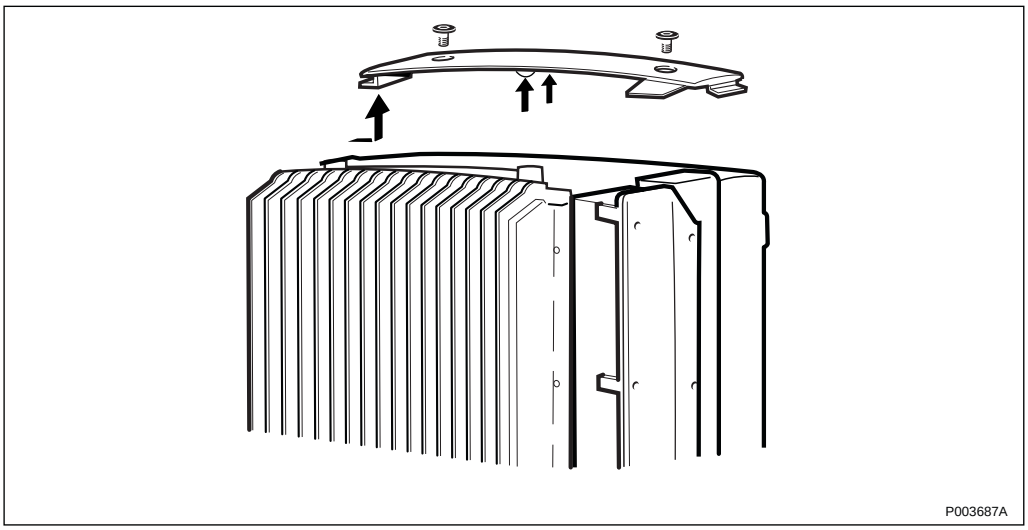

Figure 357 Replacing the upper sunshield

1. Open the installation box door.
2. Remove the screwplugs.
3. Unsnap the upper sunshield, by pressing on the middle.
4. Pull the sunshield up and to the right, and remove it.
5. Mount the new sunshield.
6. Seal the two holes with the screwplugs.
7. Close the installation box door.

Replacing the rear sunshield

Note: To replace the rear sunshield, the PBC must first be placed on the ground.

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.

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7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.
9. Remove the PBC sunshields (front, lower, left and upper).
10. Remove the cabinet, *see page 427*.

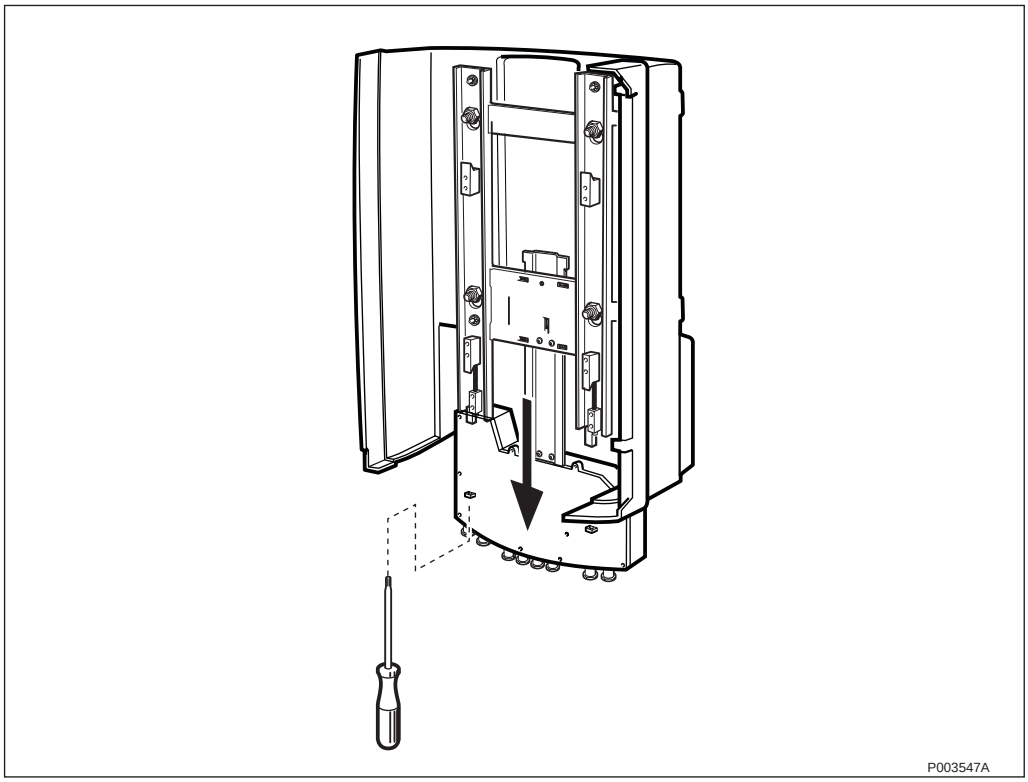

Figure 358 Releasing the interface box

11. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

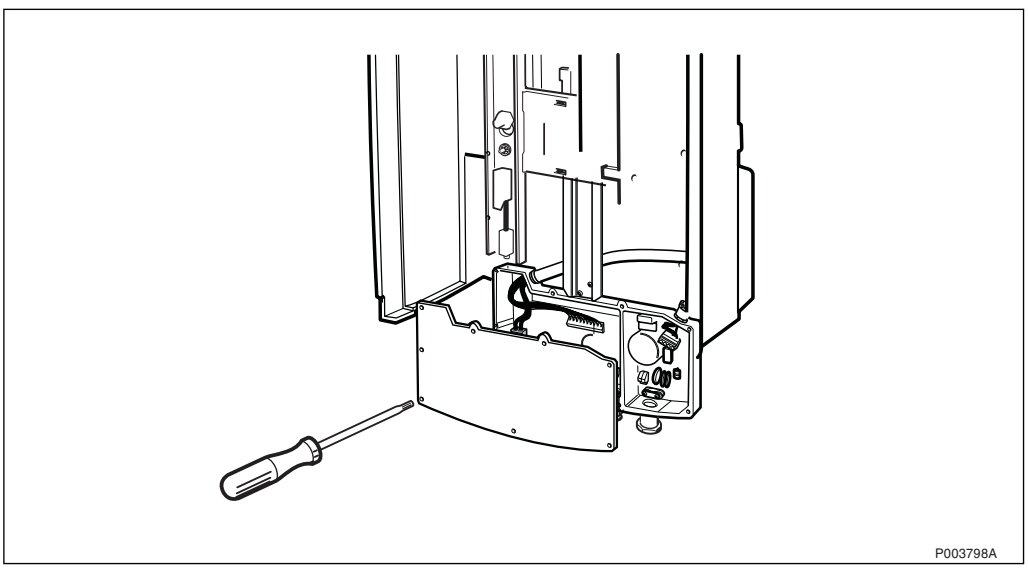

Figure 359 Loosening the interface box cover

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12. Open the cover of the interface box by removing the 9 torx screws.
13. Remove all connection terminal blocks.
14. Loosen the Protective Earth in the AC section of the interface box.
15. Loosen the two screws on the AC pull-relief clamp.
16. Dismount the cable gland.
17. Pull out the AC cable.

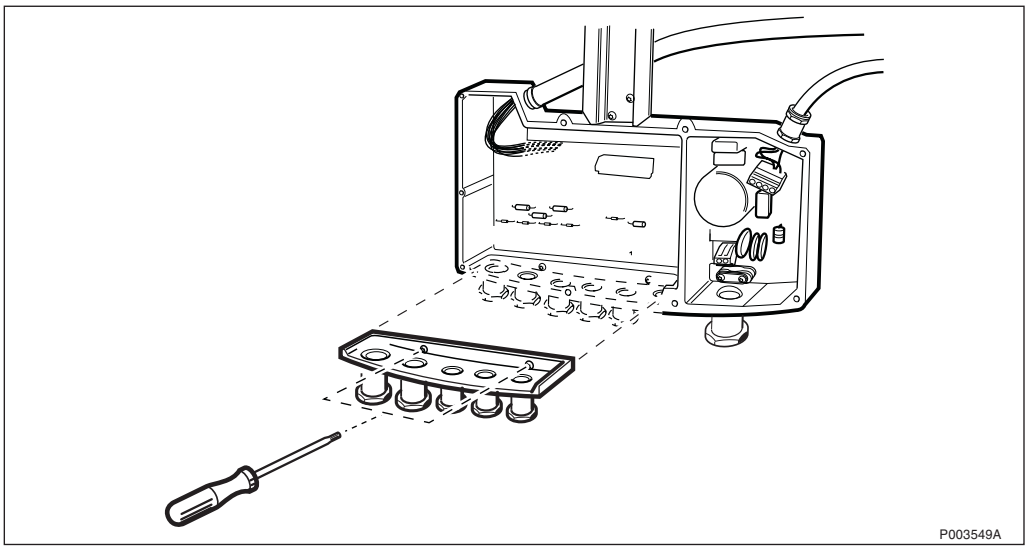

Figure 360 Loosening the gland plate

18. Loosen and remove the gland plate by unscrewing the two torx screws.

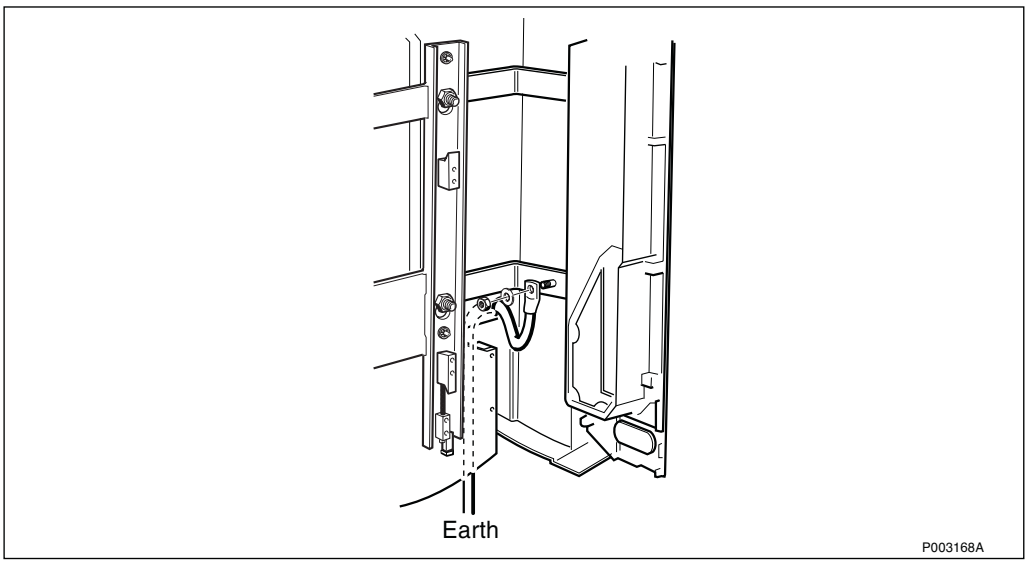

Figure 361 Removing the earth cable

19. Remove the earth cable on the mounting base.
20. Loosen the four nuts securing the mounting base.
21. Lift up the mounting base and pull it away from the wall bracket.

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22. Place the mounting base on the ground.

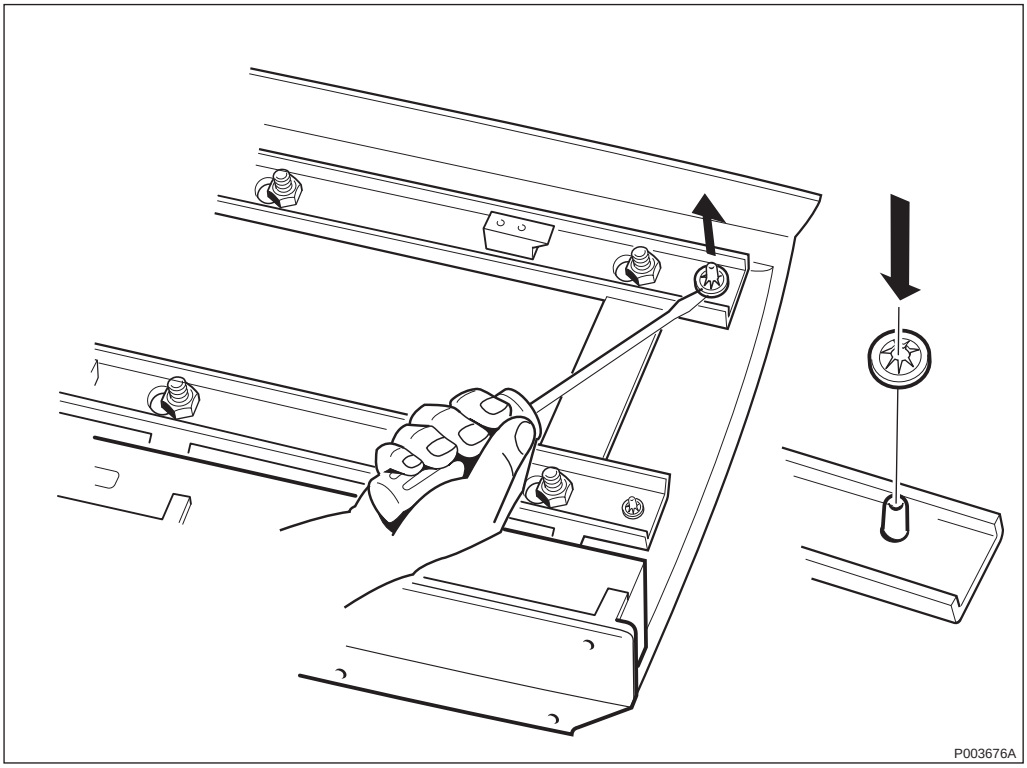

Figure 362 Removing locking washers

23. Remove the four locking washers with a screwdriver.
24. Separate the rear sunshield from the mounting base.
25. Mount the new rear sunshield and the new locking washers.
26. Remount the mounting base on the mounting plate.
27. Tighten the four nuts holding the mounting base.
28. Reconnect the earth cable to the PBC mounting base.
29. Mount the gland plate and fasten the screws.
30. Insert the AC cable and connect the Protective Earth.
31. Mount the AC cable gland.
32. Remount the remaining connection terminal blocks.
33. Remount the cover of the interface box and tighten the screws.
34. Push up the interface box and secure it in the upper position with the two torx screws.
35. To remount the cabinet on the mounting base, *see chapter Installation of Power and Battery cabinet*.
36. Remount the batteries according to *page 422*.

Set to Operation

1. Turn the AC Mains Power switch to ON position.

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2. Switch the PBC AC switch to ON position.
3. Switch the PBC Battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the Battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.6.2 Batteries

Removing the batteries

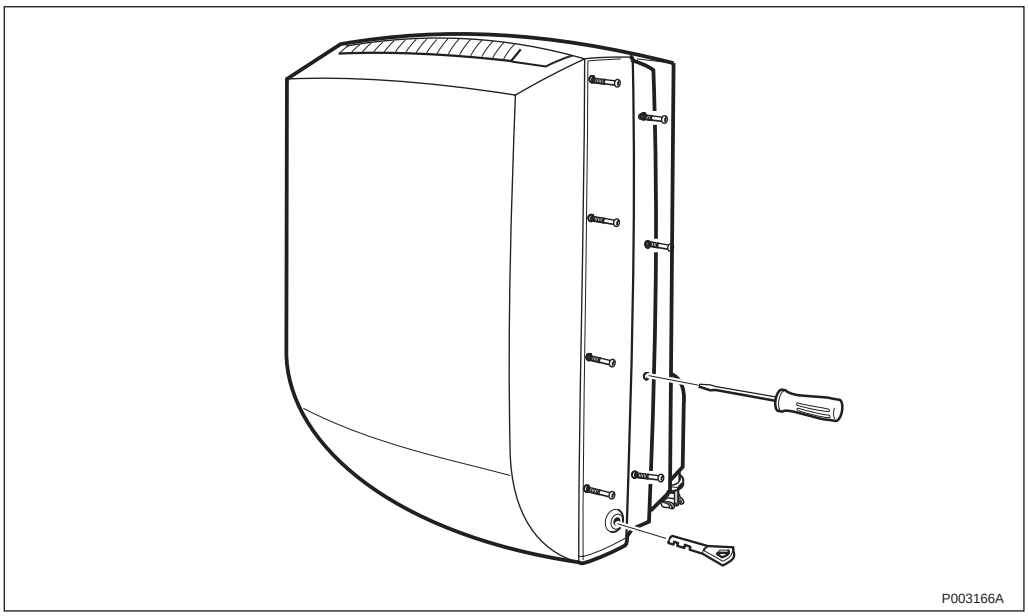

Figure 363 Opening the installation box door

1. Open the installation box door.

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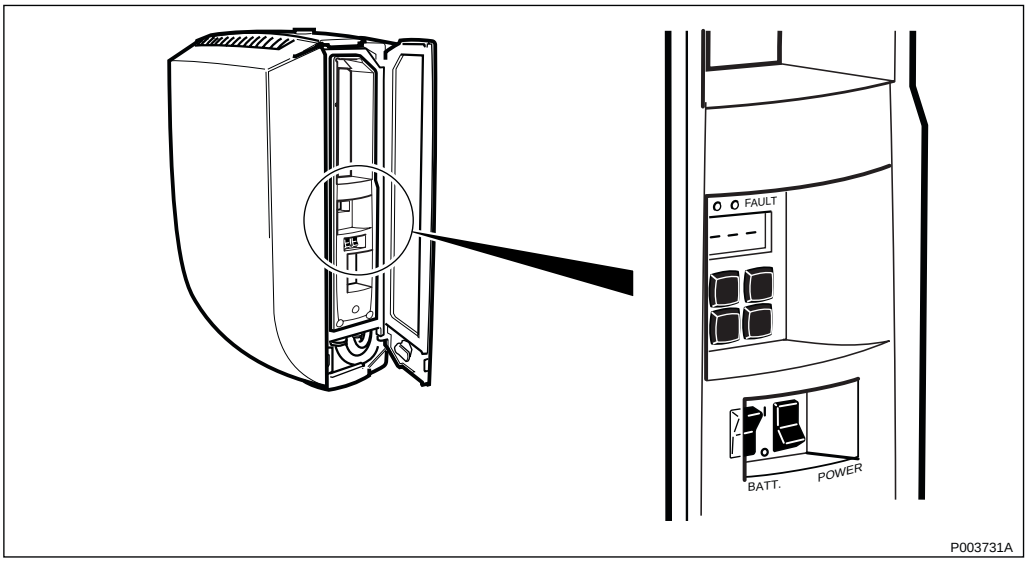

Figure 364 Battery switch

2. Switch off the battery switch.
3. Remove the front sunshield.

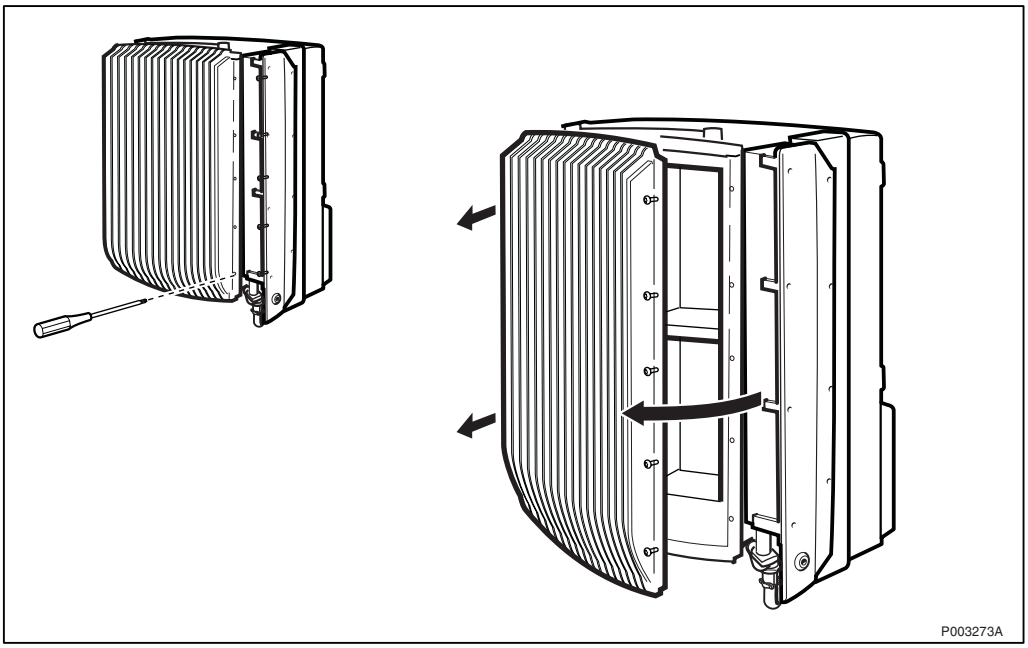

Figure 365 Opening the Battery cabinet door

4. Open the Battery cabinet door by unscrewing the 18 torx screws. Make sure that the screws are disengaged.

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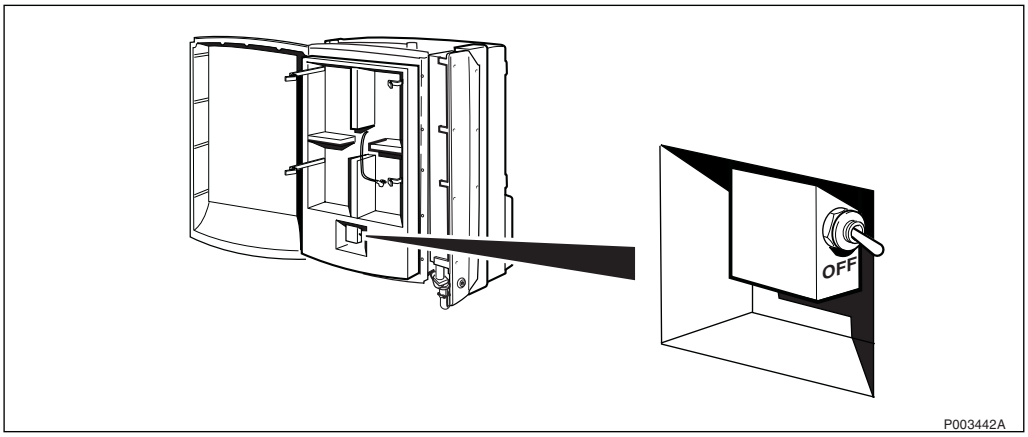

Figure 366 Automatic circuit breaker

5. Switch off the automatic circuit breaker.

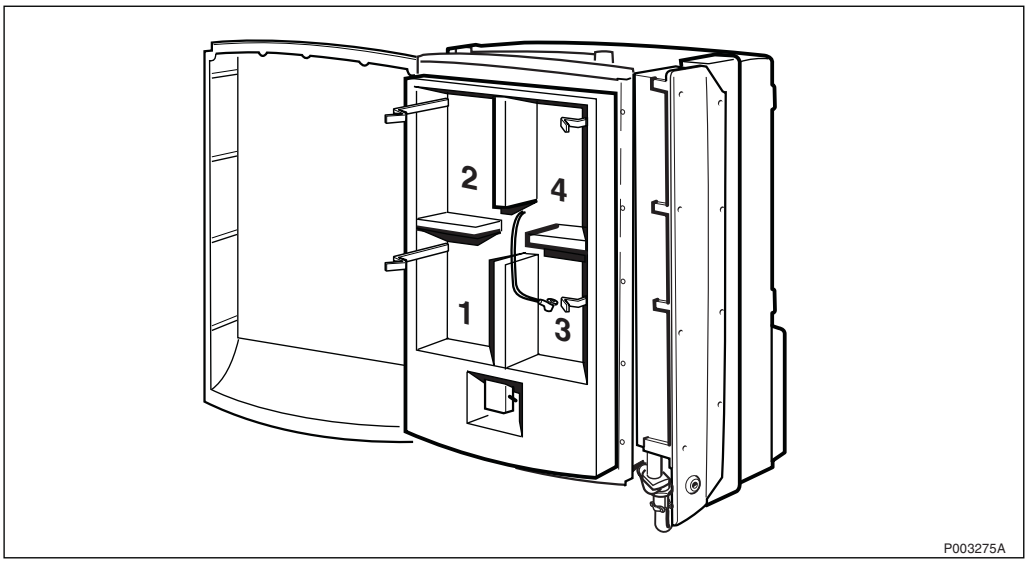

Figure 367 Battery position overview

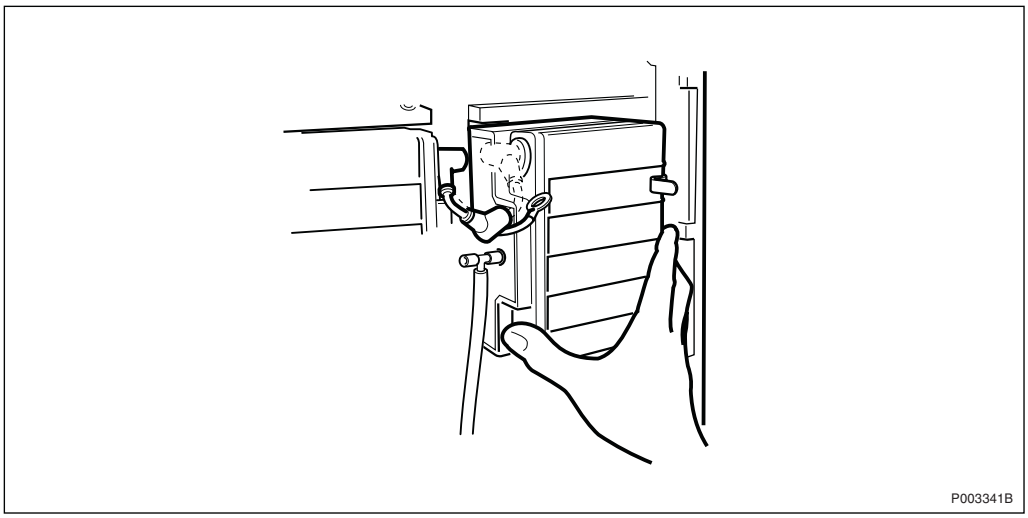

Figure 368 Disconnecting the plus-pole (+) of battery 4

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6. Disconnect the battery jumper cable on the plus-pole (+) of battery 4.

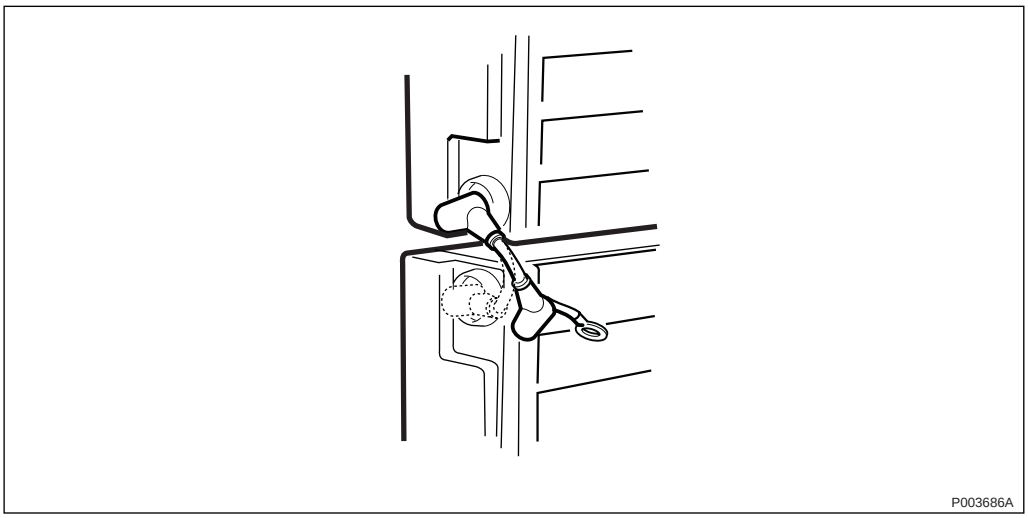

Figure 369 Disconnecting the plus-pole (+) of battery 3

7. Disconnect the battery jumper cable on the plus-pole (+) of battery 3, and remove battery 4.

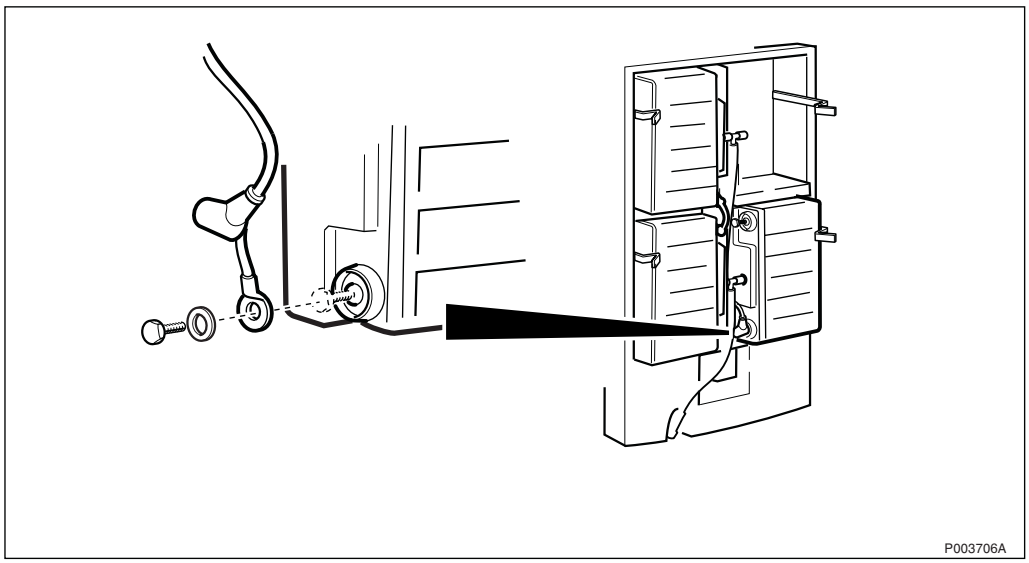

Figure 370 Disconnecting the minus-pole (-) of battery 3

8. Disconnect the minus-pole (-) of battery 3, and remove the battery.

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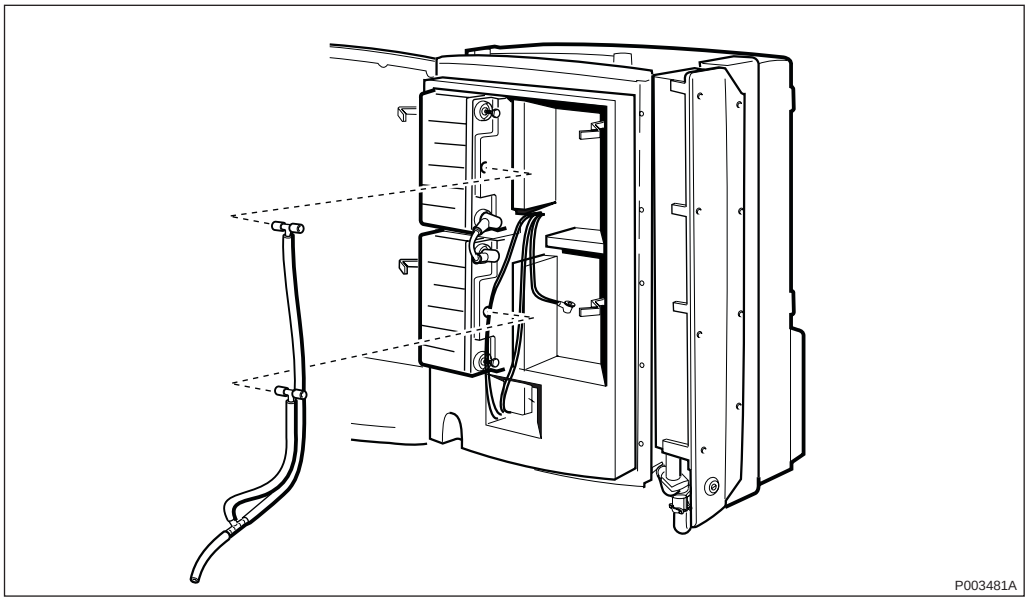

Figure 371 Removing the ventilation hoses

9. Remove the ventilation hoses from battery 1 and 2.

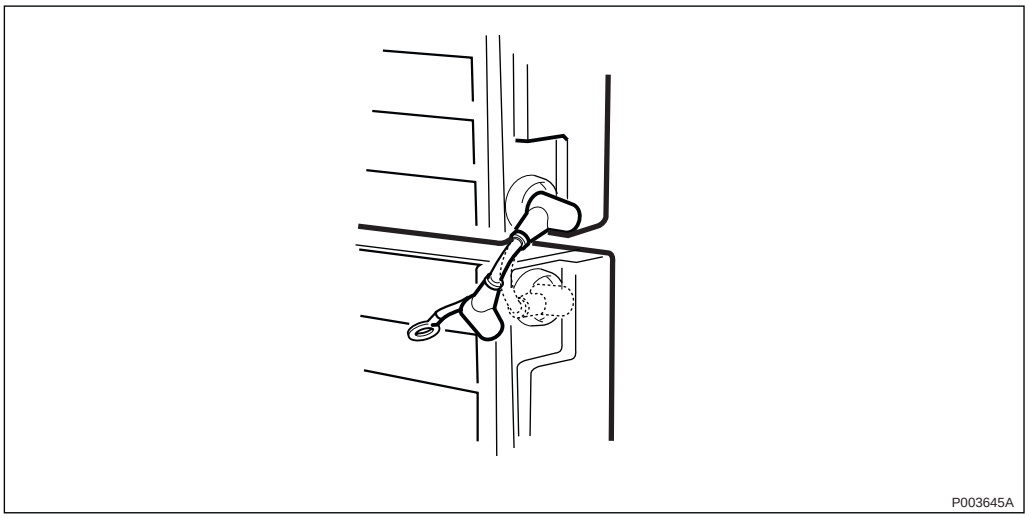

Figure 372 Disconnecting the minus-pole (-) on battery 1

10. Disconnect the battery jumper cable on the minus-pole (-) of battery 1, and remove battery 2.

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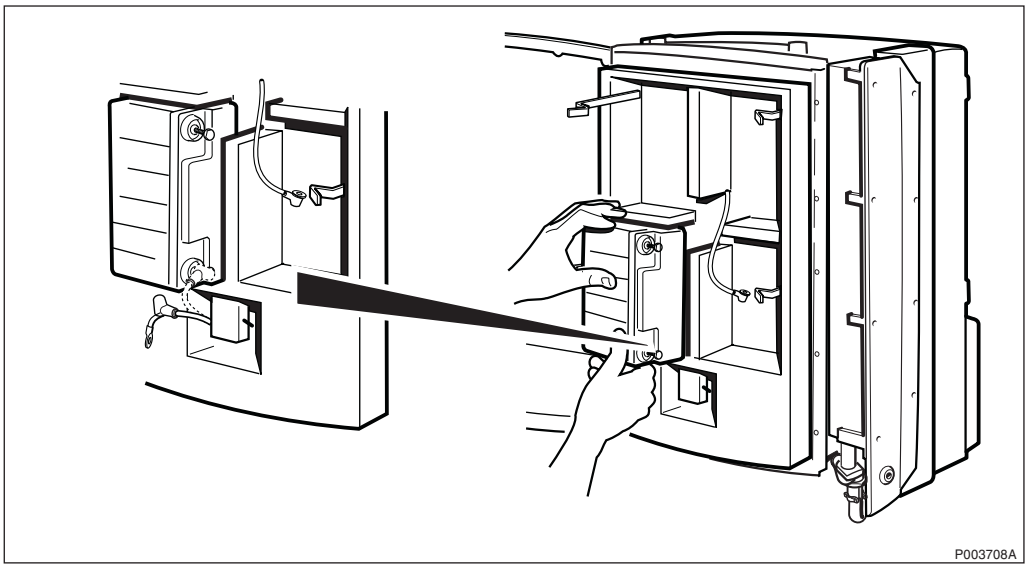

Figure 373 Disconnecting the plus-pole (+) of battery 1

11. Disconnect the plus-pole (+) of battery 1, and remove the battery.

Preparations before Installation

Note: Make sure that the cable lugs are properly mounted. If mounted incorrectly, the lugs may break.

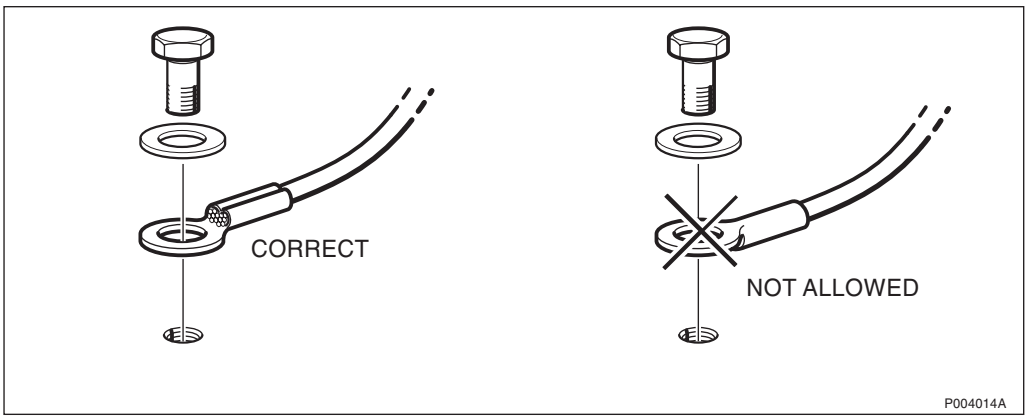

Figure 374 Connecting cable lugs to batteries

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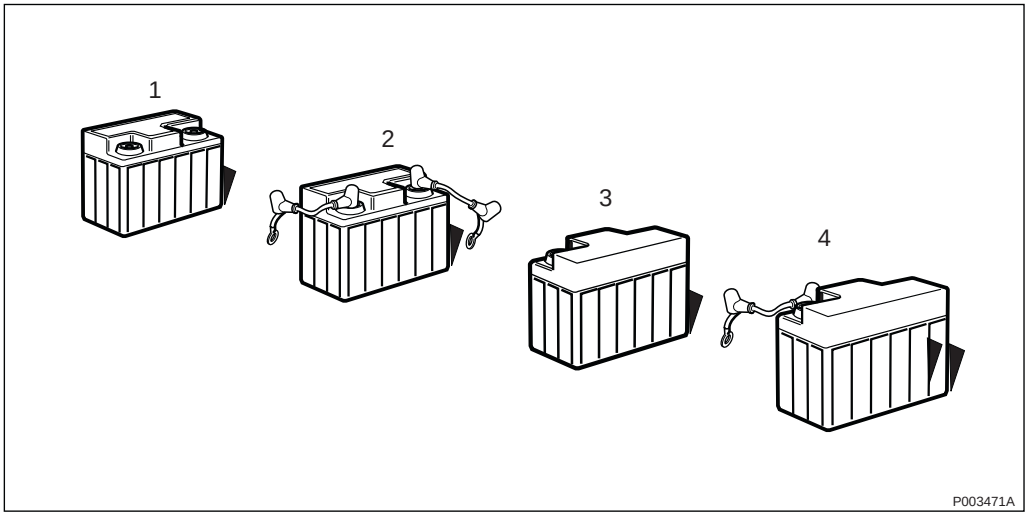

Figure 375 Battery jumper configuration

Move over all battery jumper cables from the old batteries to the new batteries, so the new set of batteries are configured in exactly the same way the old set of batteries was configured.

Note: Remove the precut tape covering the inlet to the ventilations hose on all batteries.

Note: For safety purposes, ensure that the protective cover is put back on the battery pole after each new battery is connected.

Installing the batteries

Note: It is recommended to replace *all four* batteries with new batteries at the same occasion.

Batteries must comply with the product specification *1301–BKC 861* available from the local Ericsson company. Also ensure that the lifetime of the new battery will not expire within the chosen maintenance period.

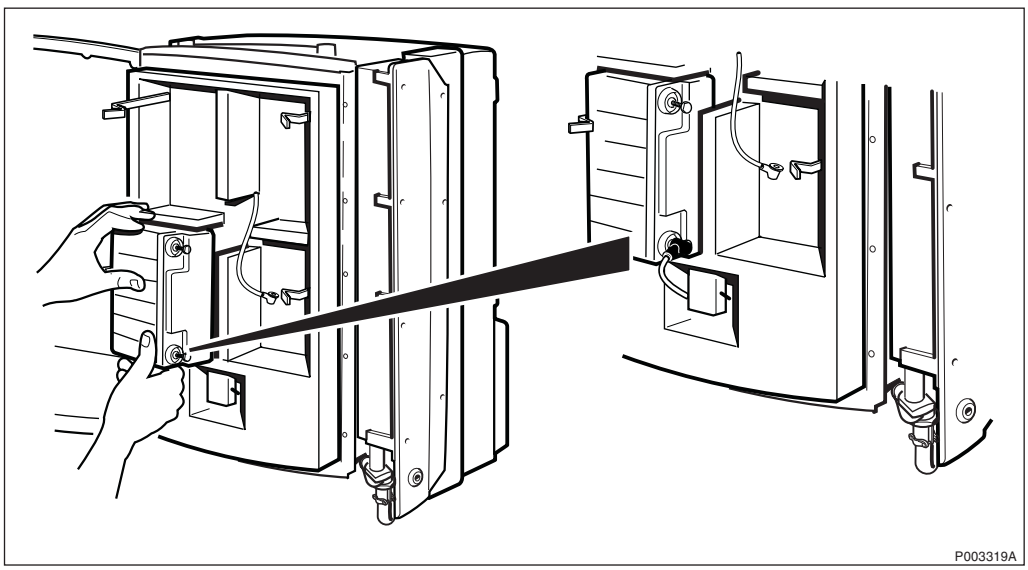

Figure 376 Installing battery 1

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1. Install battery 1 and connect the plus-pole (+).

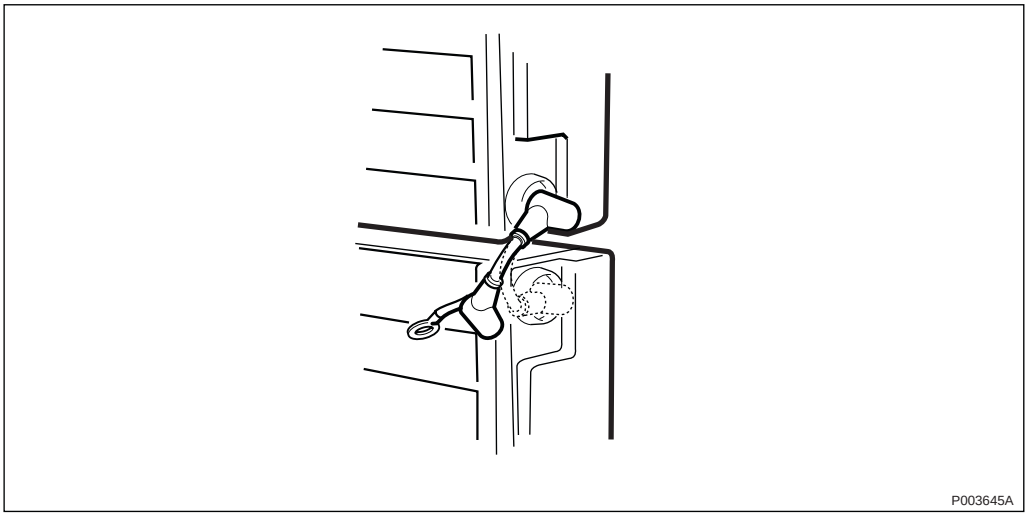

Figure 377 Installing battery 2

2. Install battery 2 with two cables preinstalled and connect the minus-pole (-) of battery 1.
3. Mount the ventilation hoses to battery 1 and 2 and guide it to the ventilation outlet down left at the bottom of the cabinet.
4. Install battery 3 and guide in the ventilation hose at the same time that the battery is tilted into position.

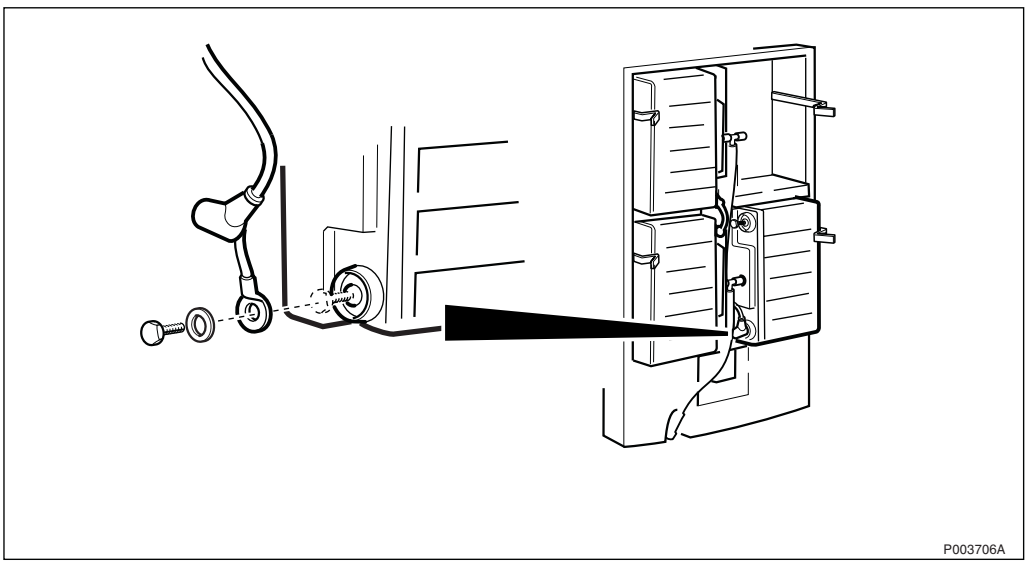

Figure 378 Connecting the minus-pole (-) of battery 3

5. Connect the minus-pole (-) of battery 3.
6. Install battery 4 and guide in the ventilation hose at the same time that the battery is tilted into position.

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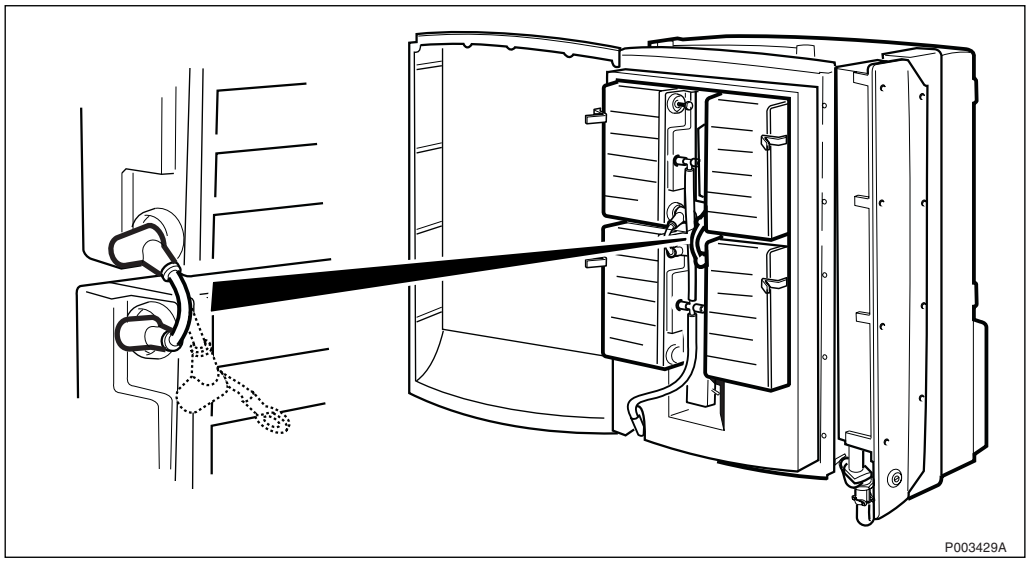

Figure 379 Connecting battery 3 and 4

7. Connect the battery jumper cable between battery 3 and 4.

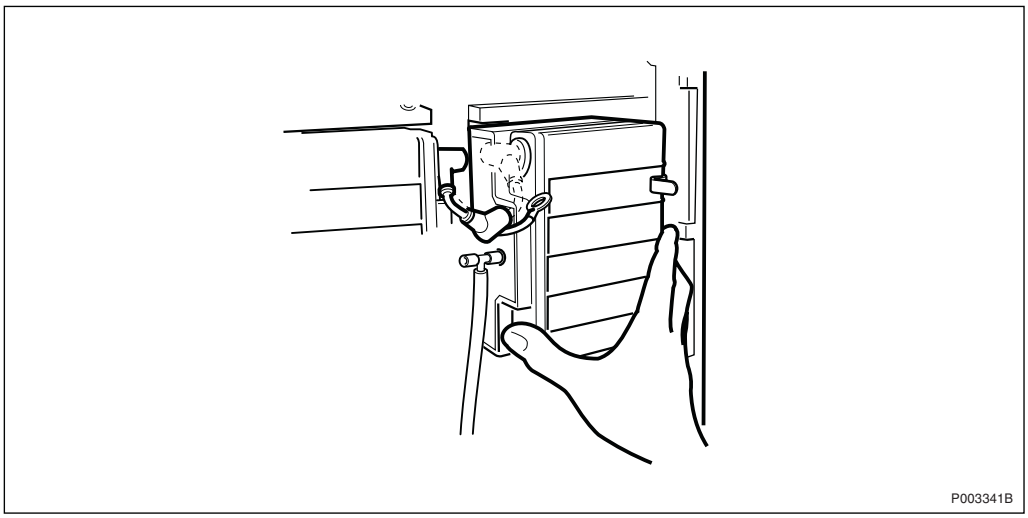

Figure 380 Connecting battery 2 and 4

8. Connect the battery jumper cable between battery 2 and 4.
9. Ensure that all cables and hoses are in the correct position so that the door can be closed.
10. Ensure that all protective covers are mounted on the battery poles.
11. Ensure that the ventilation hoses are not blocked.
12. Set the automatic circuit breaker to ON.
13. Set the battery switch to the ON position.
14. Ensure that no alarms are active on the PBC.
15. Verify the battery installation by checking the LED *Battery Fault* on the DP on the radio cabinet.
16. Close the PBC door and screw the 18 torx screws into position.

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17. Tighten the screws and mount the front sunshield.
18. Set the radio cabinet to Local Mode and update the IDB with new batteries, use the OMT to update the IDB, *see Site Installation Tests*.
19. Set the radio cabinet to Remote Mode.
20. Close and tighten the installation box doors on the RBS and the PBC.

Test after corrective action

Perform the checklist in *Section 12.9 on page 452*.

12.6.3 Cables

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

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Replacing the cables

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

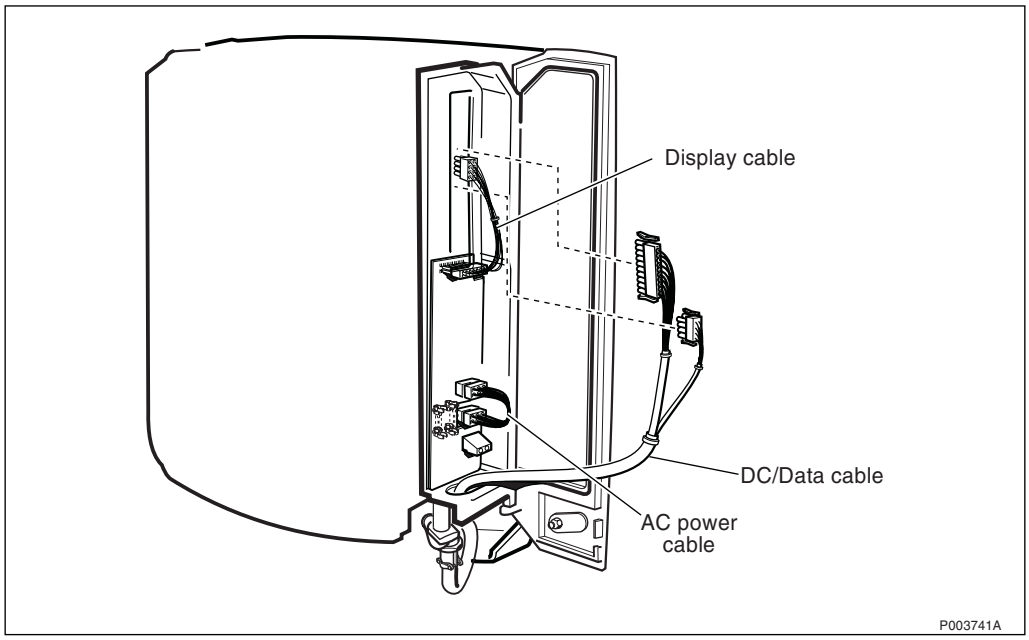

Figure 381 Overview of the cables

1. Remove the outer protective cover in the installation box by unscrewing the five torx screws.
2. Disconnect the internal AC cable, the DC/Data cable and the Display cable.
3. Connect the new cables.
4. Remount the protective cover.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box door.

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Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.6.4 Battery Cabinet

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the RBS installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Open the PBC installation box door.
7. Switch the PBC Battery switch to OFF position.
8. Switch the PBC AC switch to OFF position.
9. Switch off the AC Mains Power switch.
10. Remove the sunshields (front, lower, left and upper).

Replacing the Battery cabinet

A lifting device can be used when replacing the cabinet, *see chapter Product Data*.

Note: The lifting device is not dimensioned for the PBC assembled with batteries.

1. Unscrew the Protective Earth from the installation box door.
2. Remove the protective cover in the PBC installation box by unscrewing the two torx screws.

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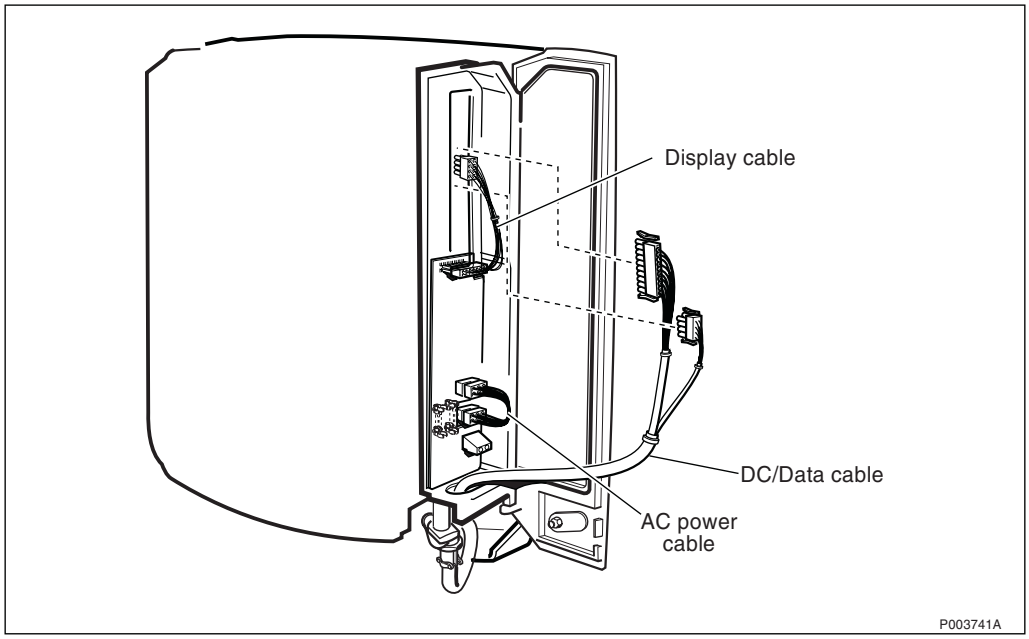

Figure 382 Overview of the cables

3. Loosen the DC/Data cables from the cabinet.

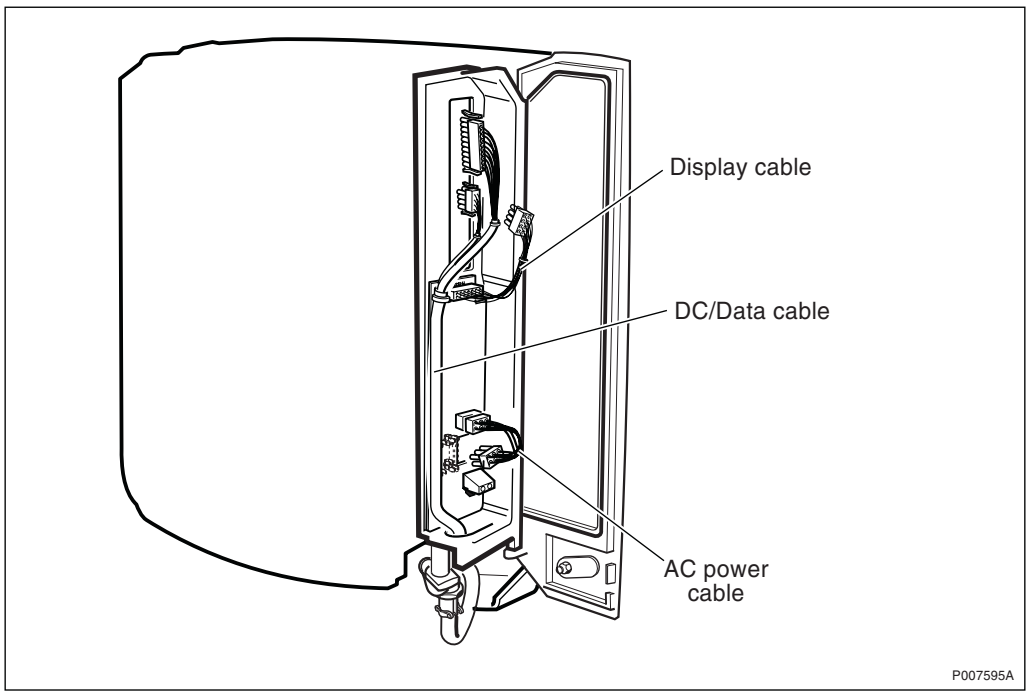

Figure 383 Loosening the AC cable and the Display cable

4. Disconnect the Display cable and the AC Power cable.

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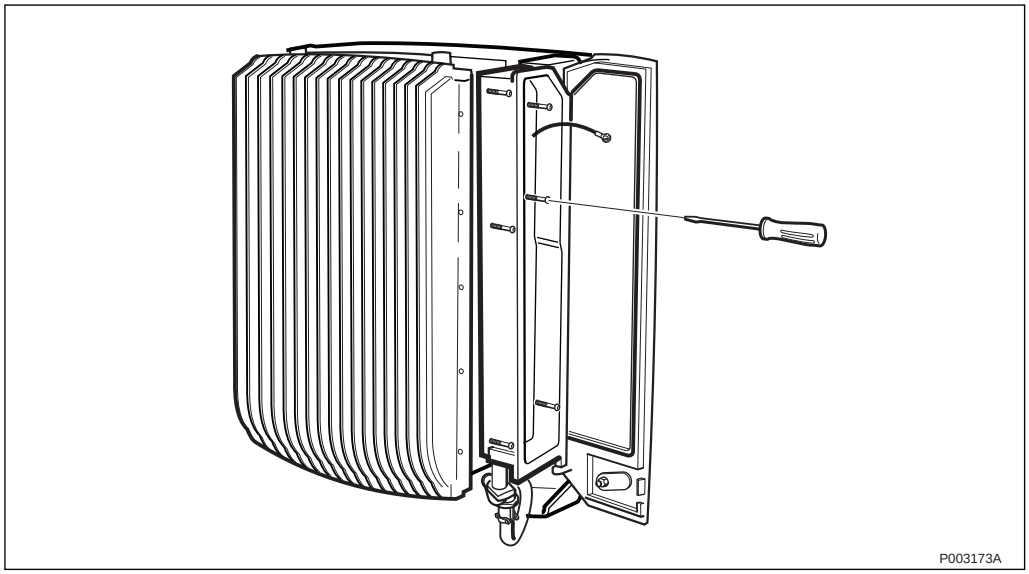

Figure 384 Loosening the installation box

5. Loosen the installation box from the cabinet by loosening the screws inside the installation box.

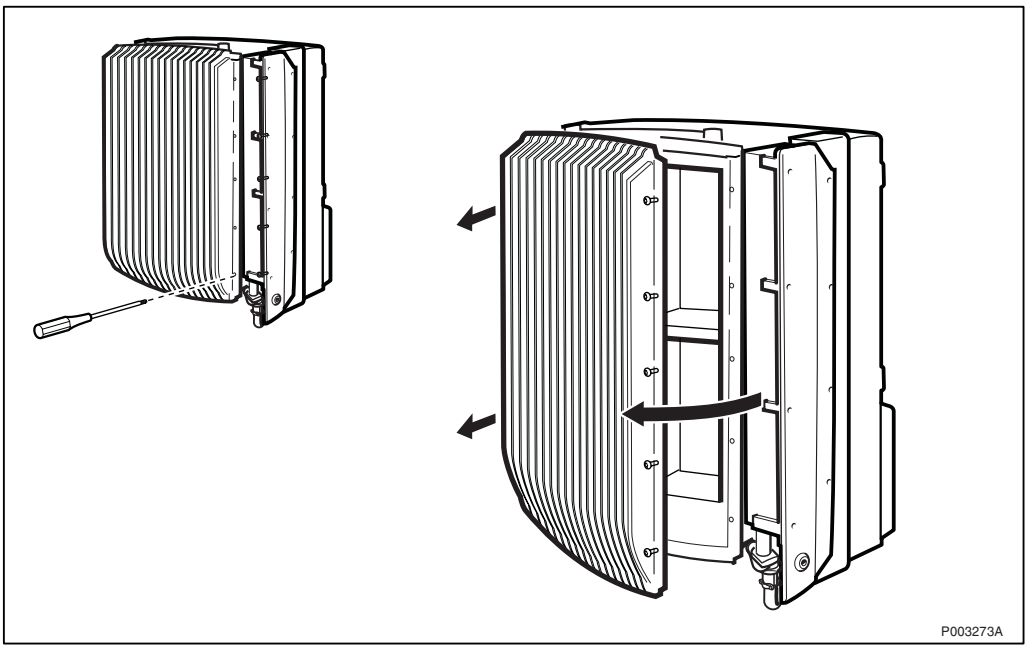

Figure 385 Opening the Battery cabinet door

6. Open the Battery cabinet door by unscrewing the 18 torx screws. Make sure that the screws are disengaged.

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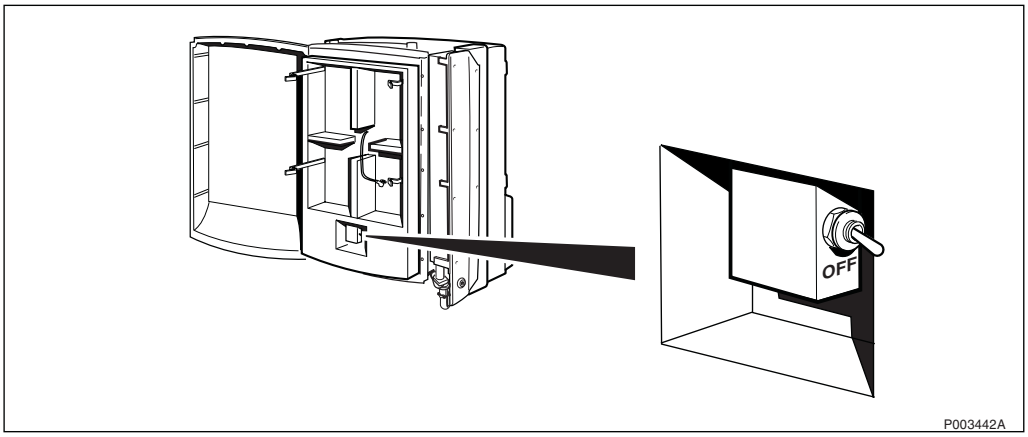

Figure 386 Automatic circuit breaker

7. Switch off the automatic circuit breaker.

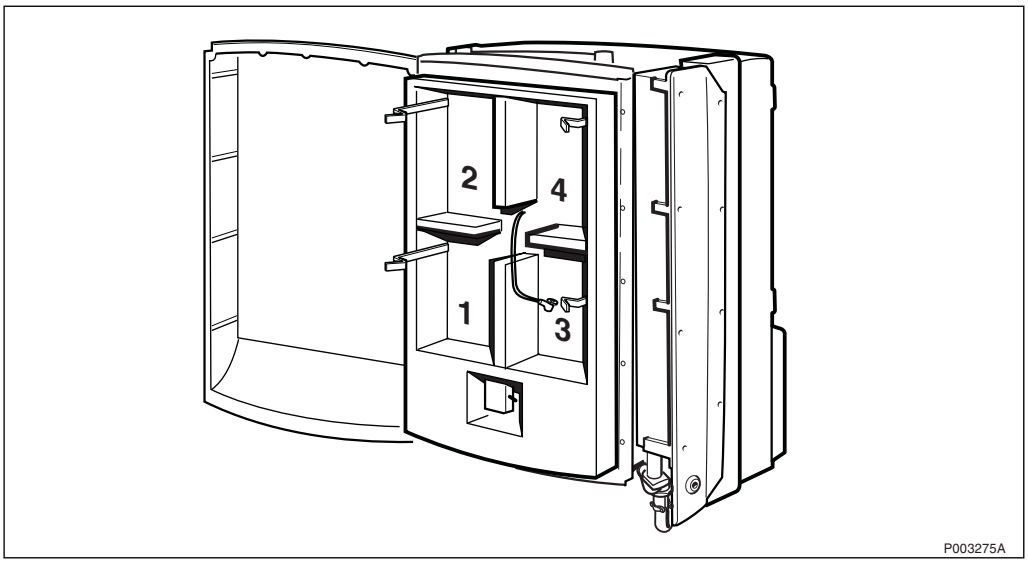

Figure 387 Battery position overview

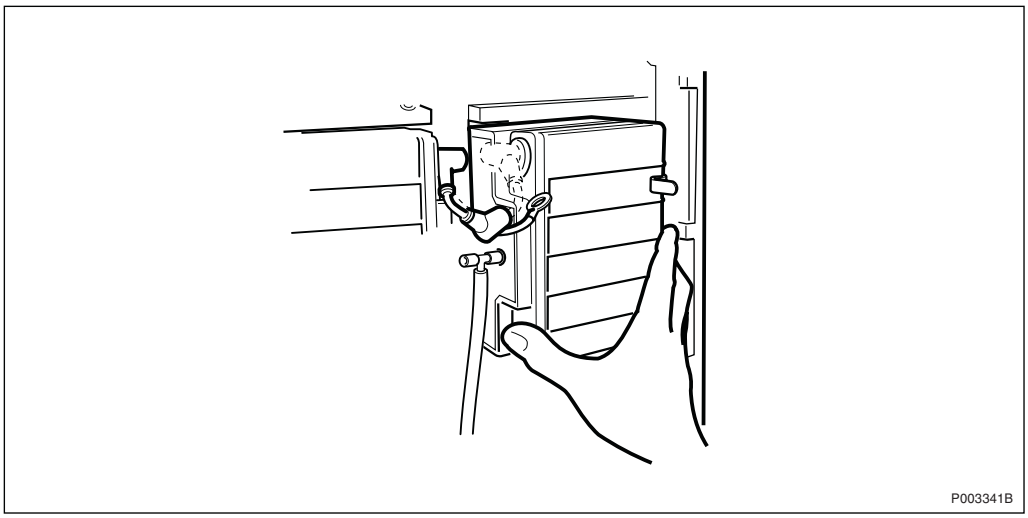

Figure 388 Disconnecting the plus-pole (+) of battery 4

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8. Disconnect the battery jumper cable on the plus-pole (+) of battery 4.

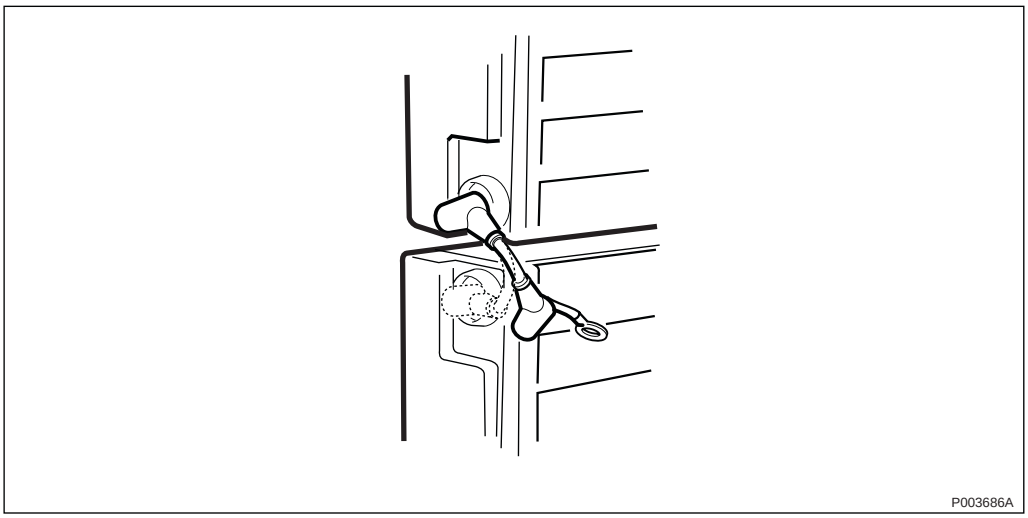

Figure 389 Disconnecting the plus-pole (+) of battery 3

9. Disconnect the battery jumper cable on the plus-pole (+) of battery 3, and remove battery 4.

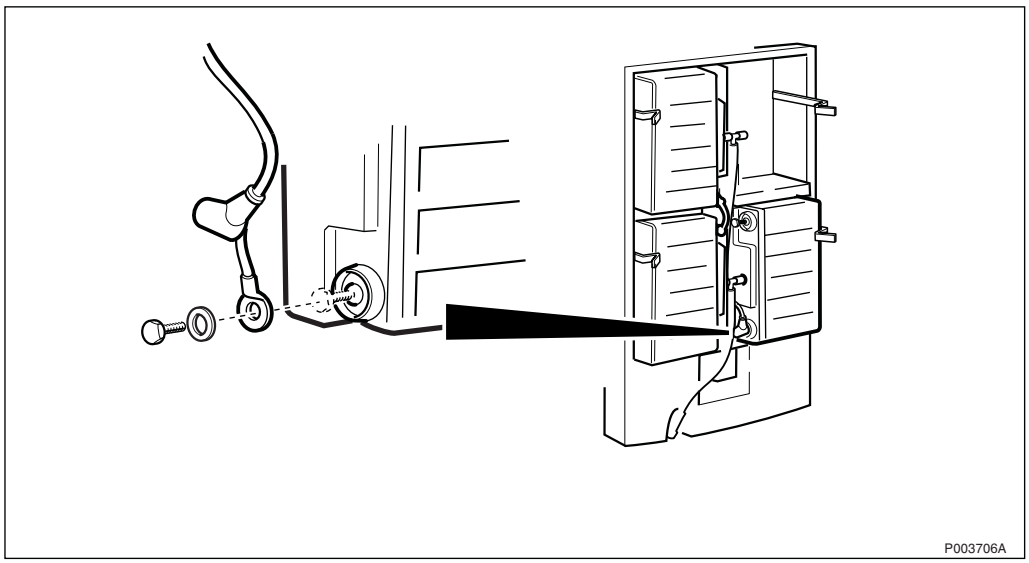

Figure 390 Disconnecting the minus-pole (-) of battery 3

10. Disconnect the minus-pole (-) of battery 3, and remove the battery.

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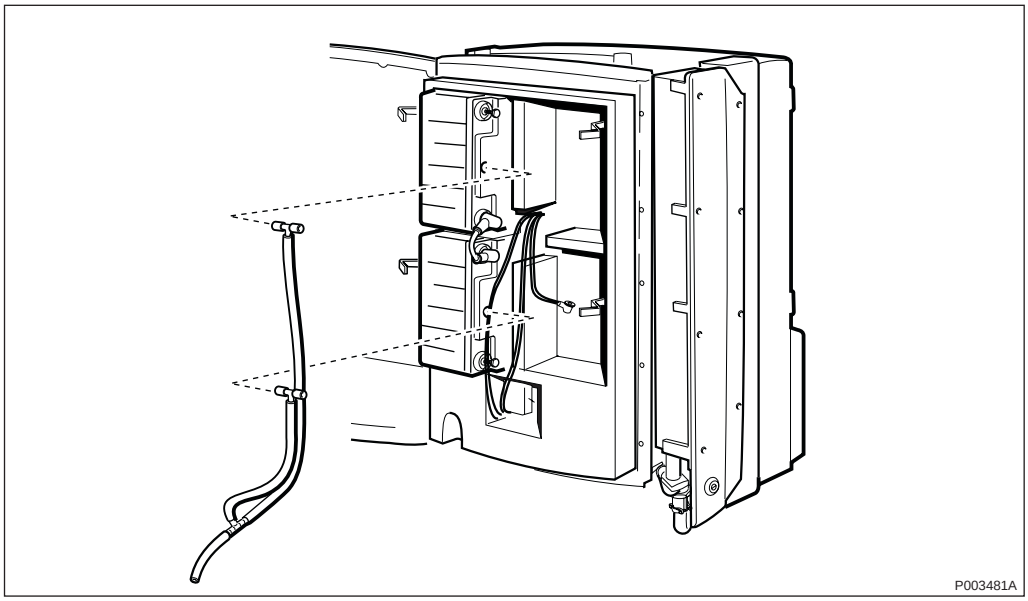

Figure 391 Removing the ventilation hoses

11. Remove the ventilation hoses from battery 1 and 2.

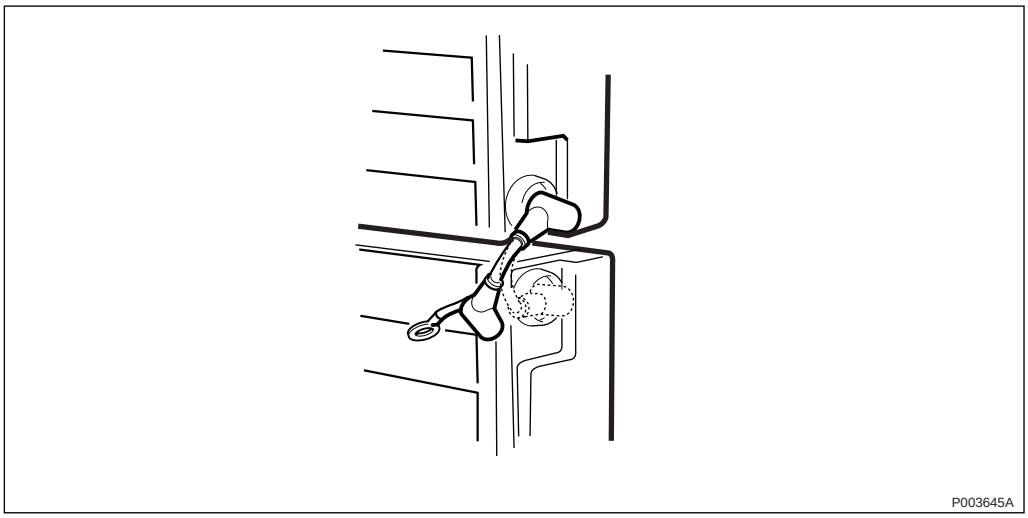

Figure 392 Disconnecting the minus-pole (-) on battery 1

12. Disconnect the battery jumper cable on the minus-pole (-) of battery 1, and remove battery 2.

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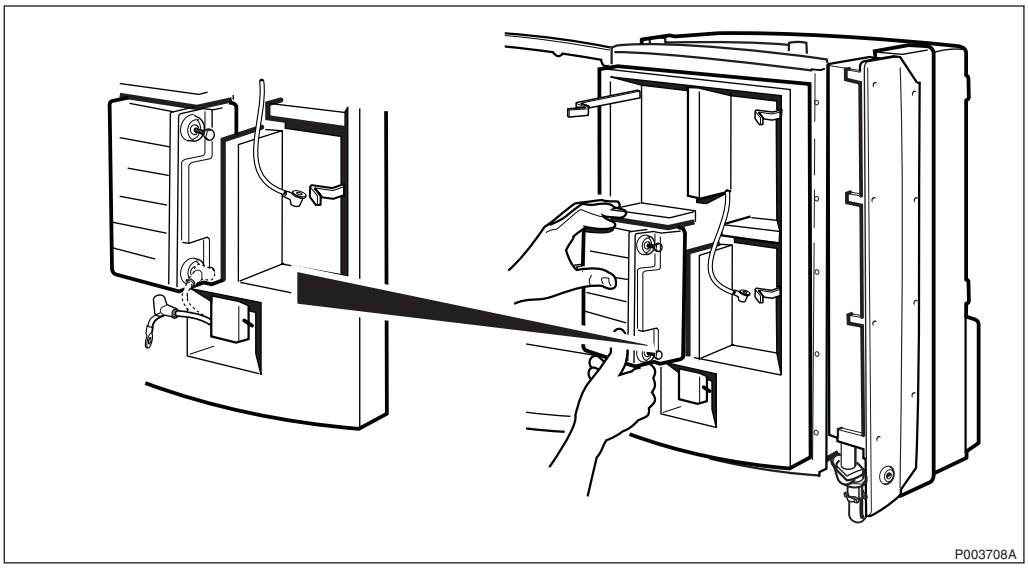

Figure 393 Disconnecting the plus-pole (+) of battery 1

13. Disconnect the plus-pole (+) of battery 1, and remove the battery.

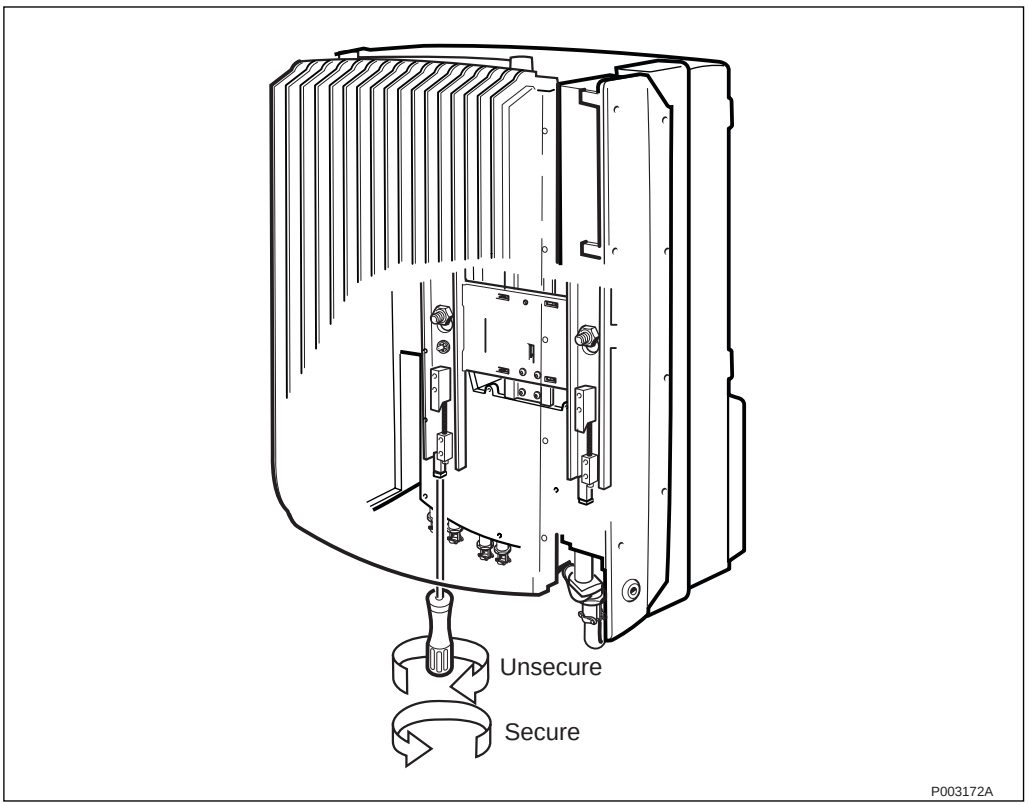

Figure 394 Loosening the cabinet

14. Close the battery cabinet door and tighten one screw in each corner.

15. Loosen the two screws holding the cabinet.

Note: Sometimes the two locking parts are jammed together causing the screw to move downwards instead of the wedge part moving up. This is solved simply by striking the back

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of the torx screwdriver with the hand, when the screw has been screwed down approximately 20 mm.

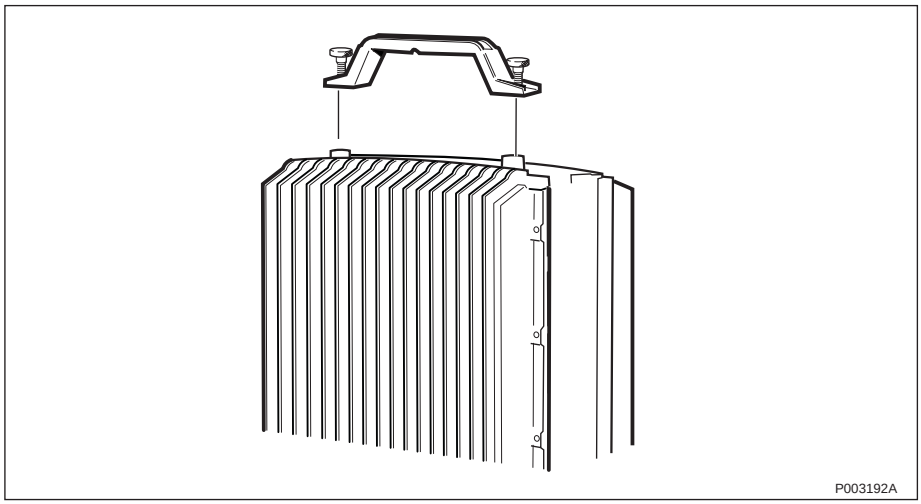

Figure 395 Mounting the optional lifting handle

16. If the lifting handle (optional) is to be used, mount it on top of the cabinet.

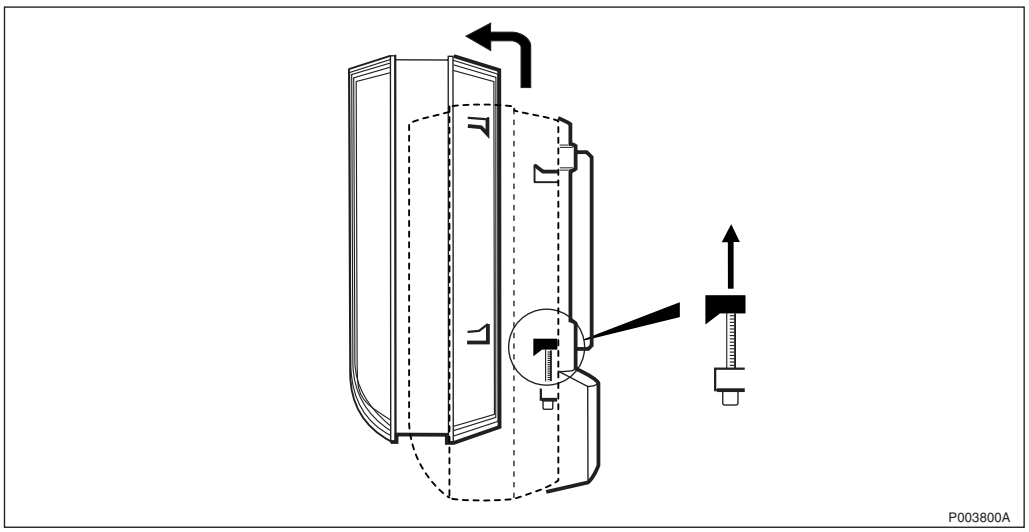

Figure 396 Unhooking the PBC

17. Remove the cabinet by lifting it up and away from the mounting base.
18. To remount the new cabinet, *see chapter Installation of Power and Battery Cabinet*.
19. Install the batteries according to *page 422*.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.

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4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.

Test after corrective action

1. Perform a battery backup test, *see chapter Site Installation Tests*.
2. Perform the antenna attenuator settings to calibrate the antenna, *see chapter Antenna System Tests*.
3. Perform the checklist in *Section 12.9 on page 452*.

12.6.5 Fuses

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door.
3. Set the RBS to Local Mode.
4. Switch the RBS battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the fuses

1. Open the installation box door.

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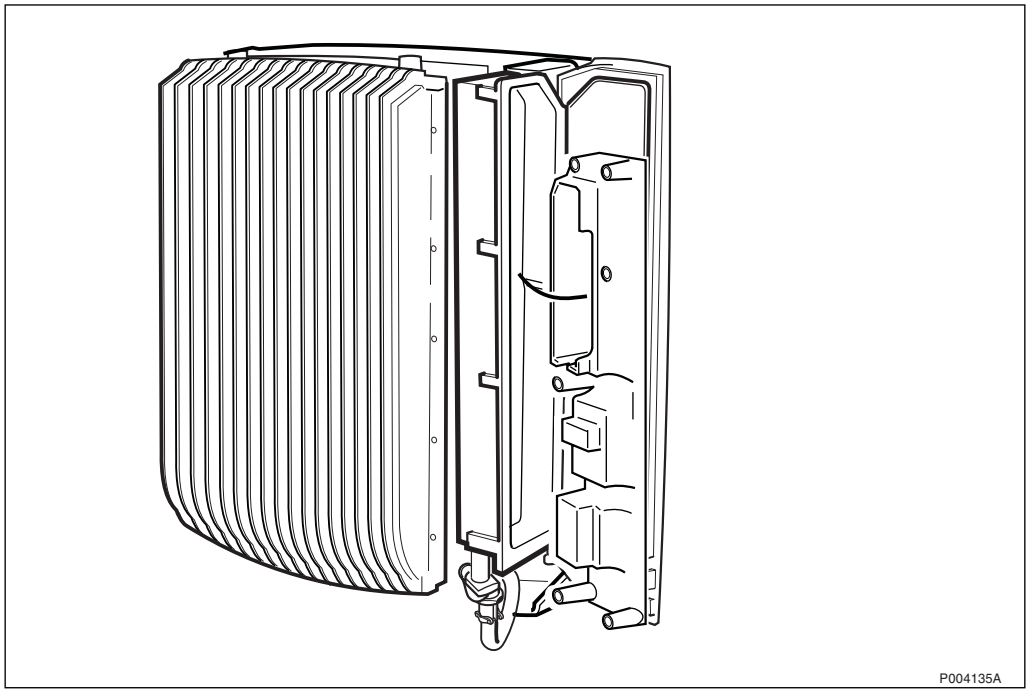

Figure 397 Removing the protective cover

2. Remove the protective cover by loosening the two torx screws.

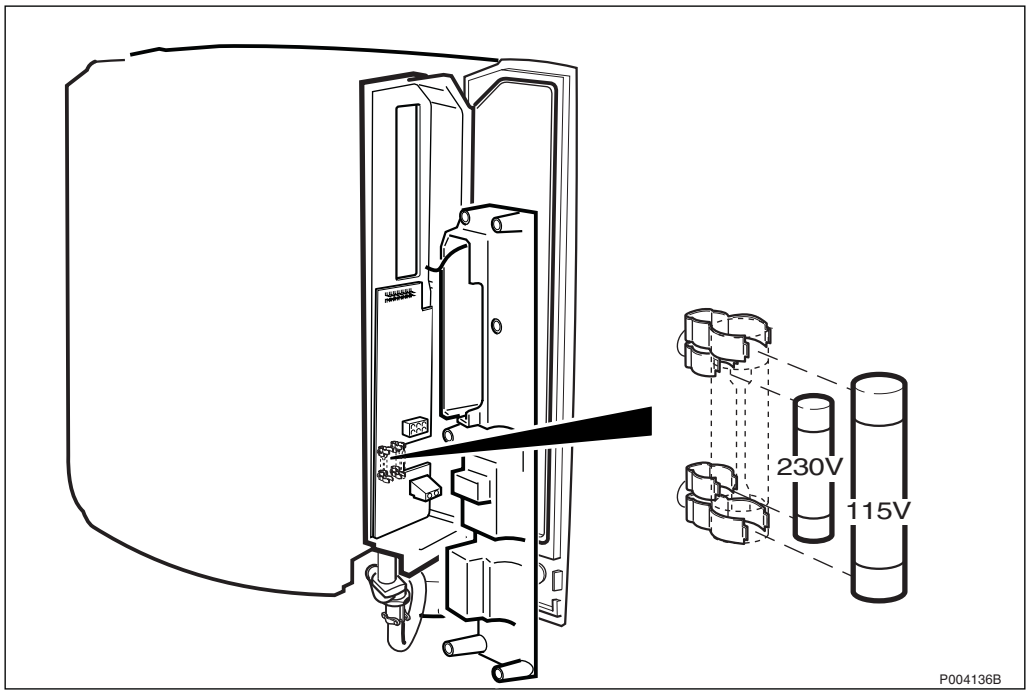

Figure 398 Replacing the fuses

3. Replace the faulty fuses with new fuses.

Table 67 Fuses

Voltage	Fuses Data	Dimension
100-127 V AC	Ceramic Slow Blow 8 A, 250 V (1)	6.3x32 mm
200-250 V AC	Ceramic Slow Blow 6.3 A, 250 V (1)	5x20 mm

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(1) Fuse according to standard EN 60127.

4. Remount the protective cover by tightening the five torx screws.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.6.6 EMC Board

Prior to Replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door on the radio cabinet.
3. Set the RBS to Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the EMC board

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

1. Open the installation box door on the battery cabinet.

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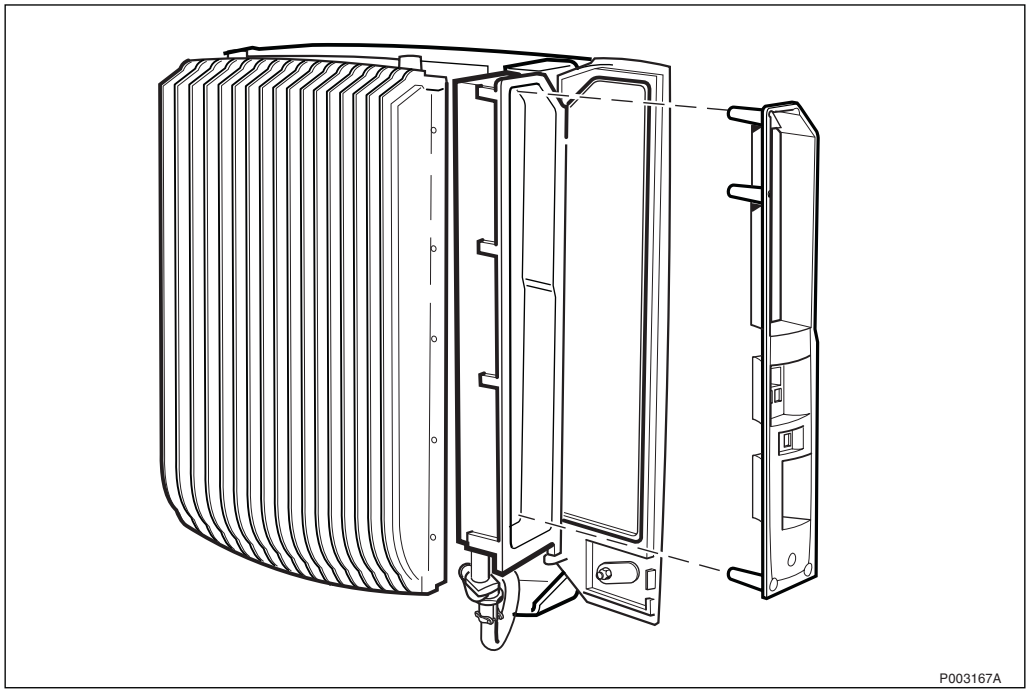

Figure 399 Removing the protective cover

2. Remove the protective cover by loosen the five torx screws.

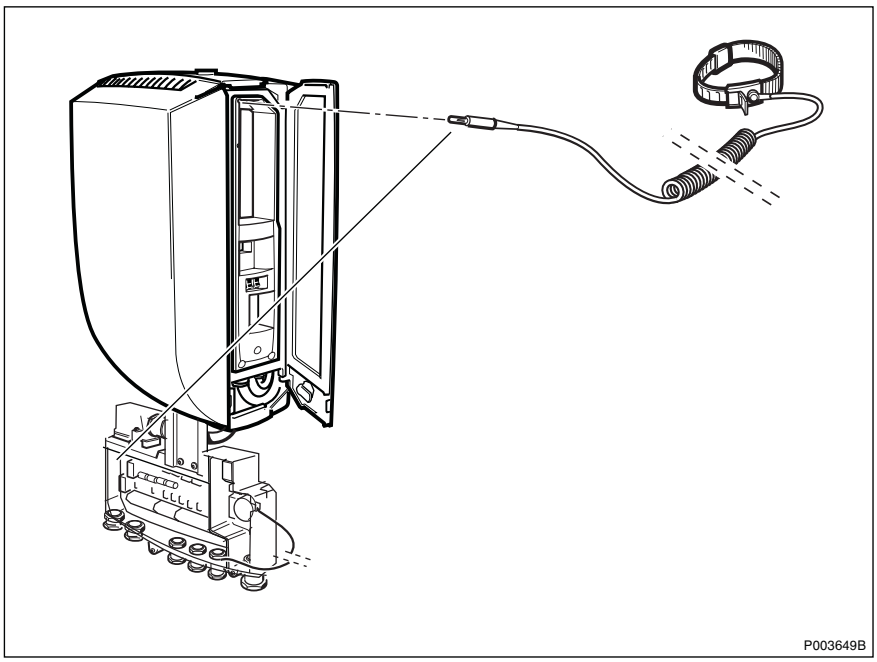

Figure 400 Connecting the ESD wrist strap

3. Connect the ESD wrist strap to the ESD connection point in the installation box.

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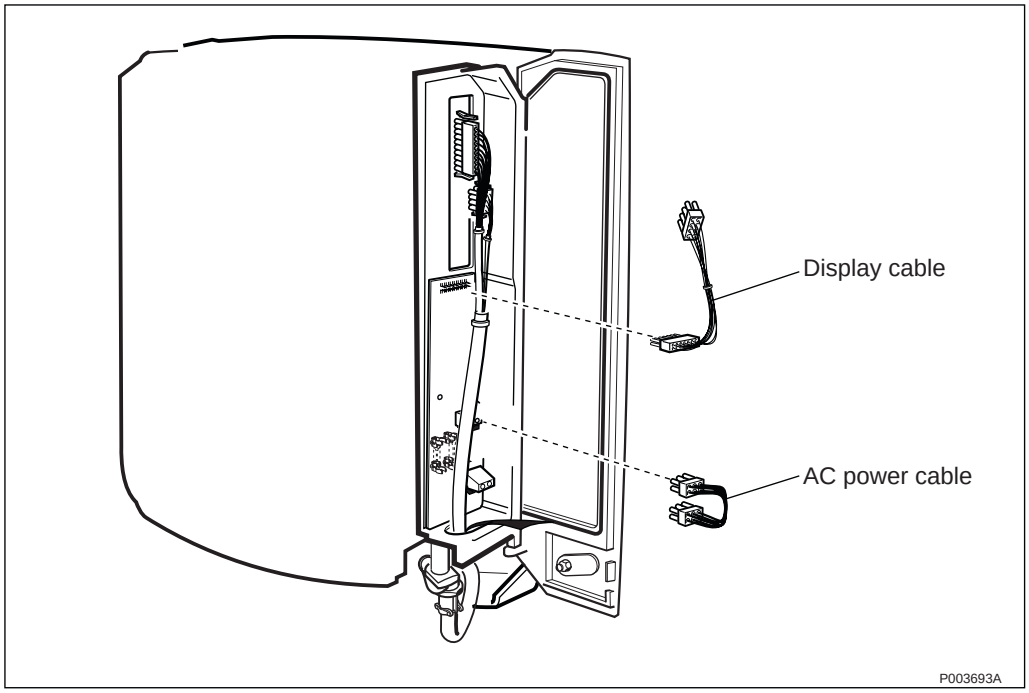

Figure 401 Overview of the cables

4. Disconnect the Display cable and AC Power cable.

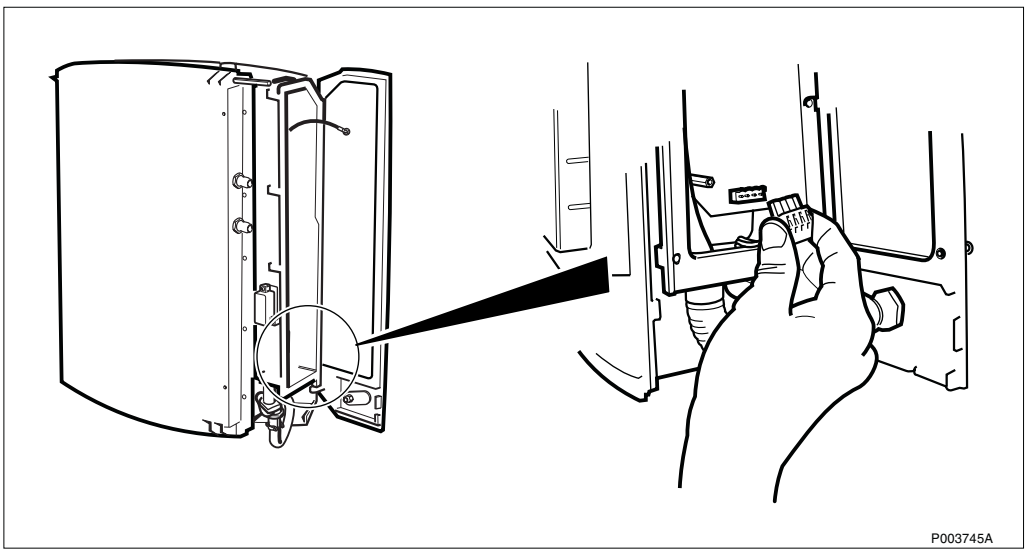

Figure 402 Disconnecting the AC cable

5. Disconnect the AC cable from the interface box on the EMC board.

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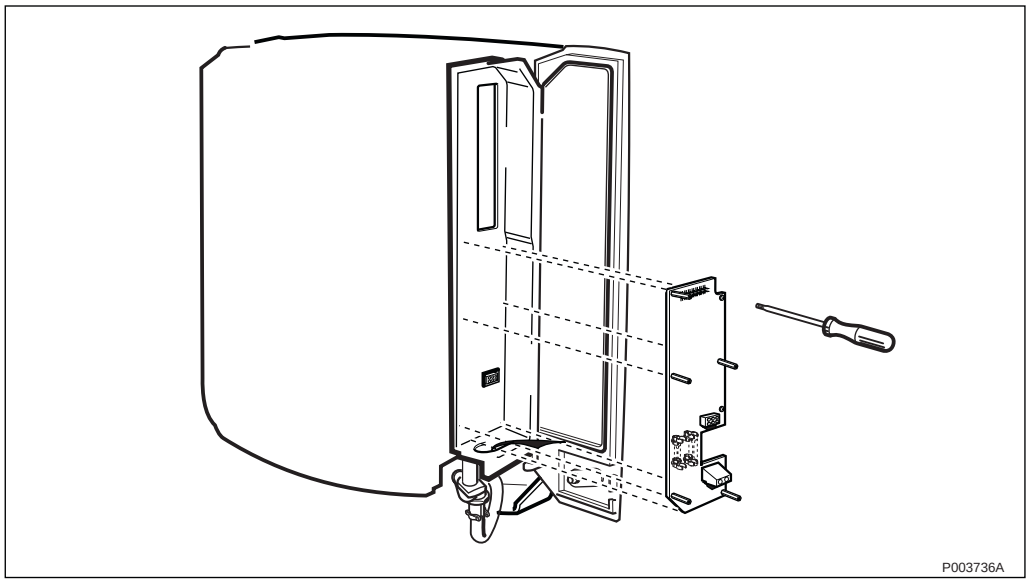

Figure 403 Removing the EMC board

6. Unscrew the 7 torx screws.
7. Mount fuses corresponding to the correct voltage on the new EMC board.
8. Mount the new EMC board.
9. Mount the 7 torx screws.
10. Connect the cables to the EMC board.
11. Remount the protective cover with the two torx screws.

Set to operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box door.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.6.7 DC Surge Board

Prior to replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.

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2. Open the installation box door for the radio cabinet.
3. Set the RBS to Local Mode.
4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the DC Surge Board

CAUTION

Sensitive components such as Integrated Circuits (IC) can be damaged by discharges of static electricity.

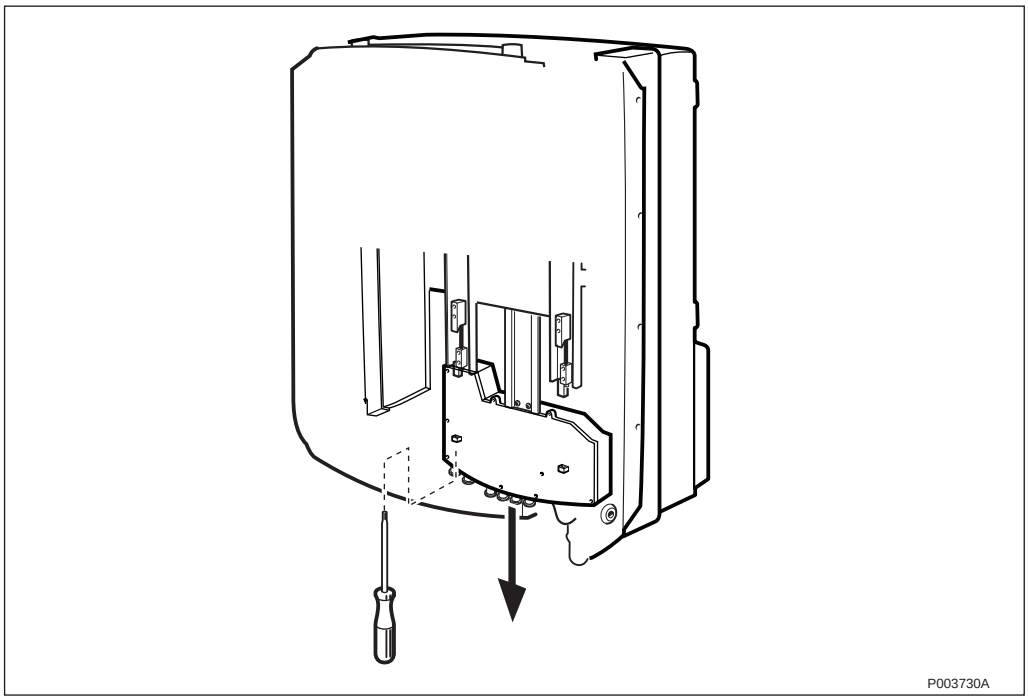

Figure 404 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

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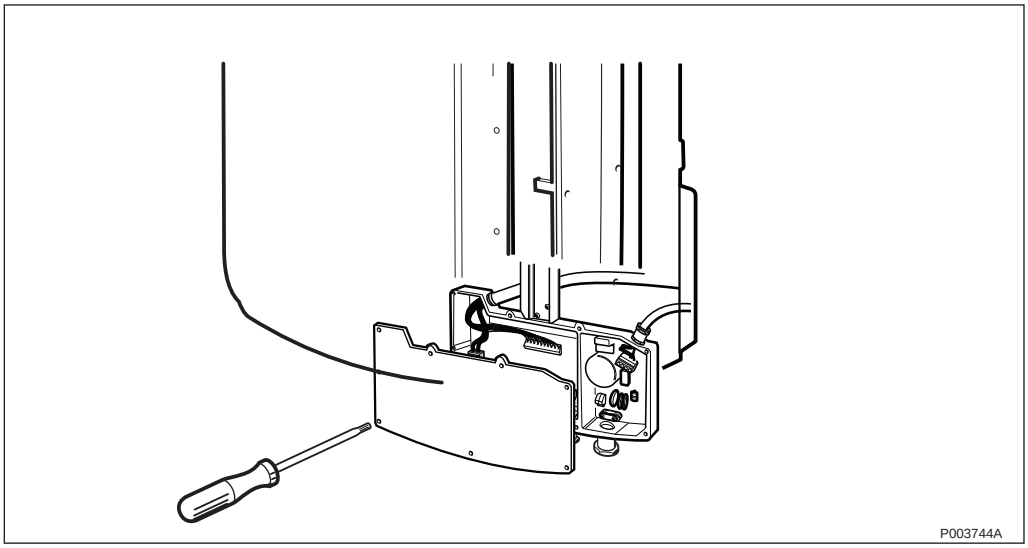

Figure 405 Loosening the interface box cover

2. Open the cover of the interface box by removing the 9 torx screws.

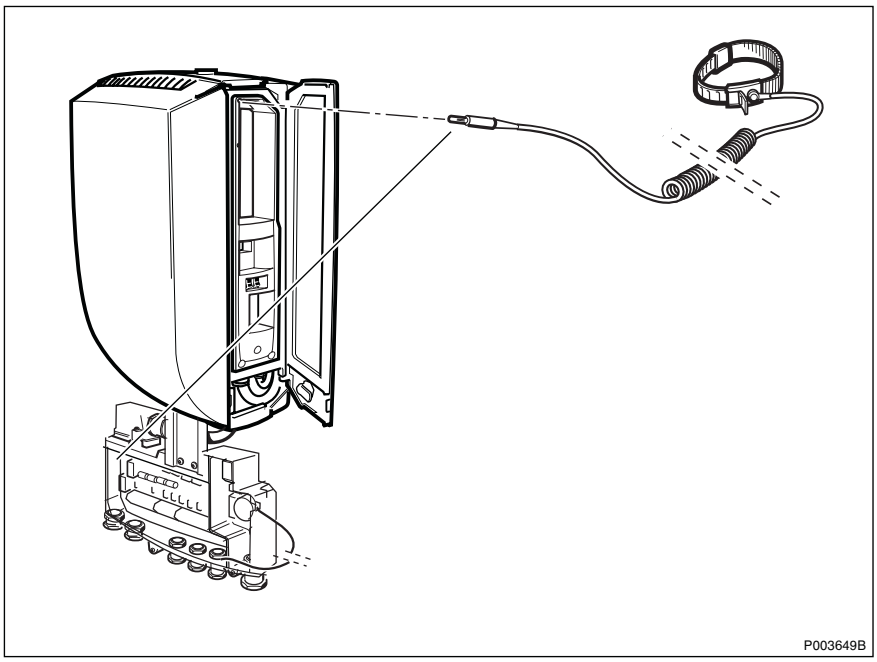

Figure 406 Connecting the ESD wrist strap

3. Connect the ESD wrist strap to the ESD connection point in the installation box.
4. Remove all connection terminal blocks.
5. Loosen the internal -48 V DC cable from the fixed terminal block. Make sure to remember the cable position or write it down.

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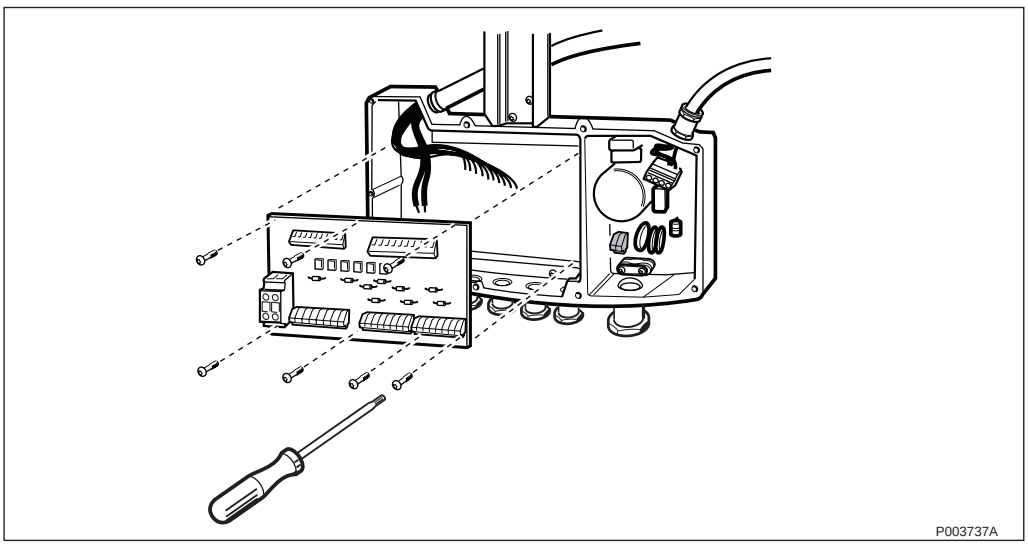

Figure 407 Removing the DC/Surge board

6. Unscrew all screws holding the DC Surge board.
7. Mount the new board and tighten the screws.
8. Plug in all connection terminal blocks.
9. Install the -48V DC cable.
10. Remove the ESD wrist strap
11. Mount the cover and tighten the screws.
12. Push up the interface box and secure it in the upper position with the two torx screws.

Set to Operation

1. Switch on the AC Mains Power switch.
2. Switch on the AC and Battery switch on the battery cabinet.
3. Switch on the AC and Battery switch on the radio cabinet.
4. Set the radio cabinet to Remote Mode.
5. Close and tighten the installation box doors.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.6.8 AC Board

Prior to replacement

1. Inform the OMC operator that the RBS will be removed from service temporarily.
2. Open the installation box door for the radio cabinet.
3. Set the RBS to Local Mode.

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4. Switch the RBS Battery switch to the OFF position.
5. Switch the RBS AC switch to the OFF position.
6. Switch the PBC Battery switch to OFF position.
7. Switch the PBC AC switch to OFF position.
8. Switch off the AC Mains Power switch.

Replacing the AC board

DANGER

High voltage is used in the operation of this equipment. Both direct contact with the mains power and indirect contact via damp or moisture can be fatal.

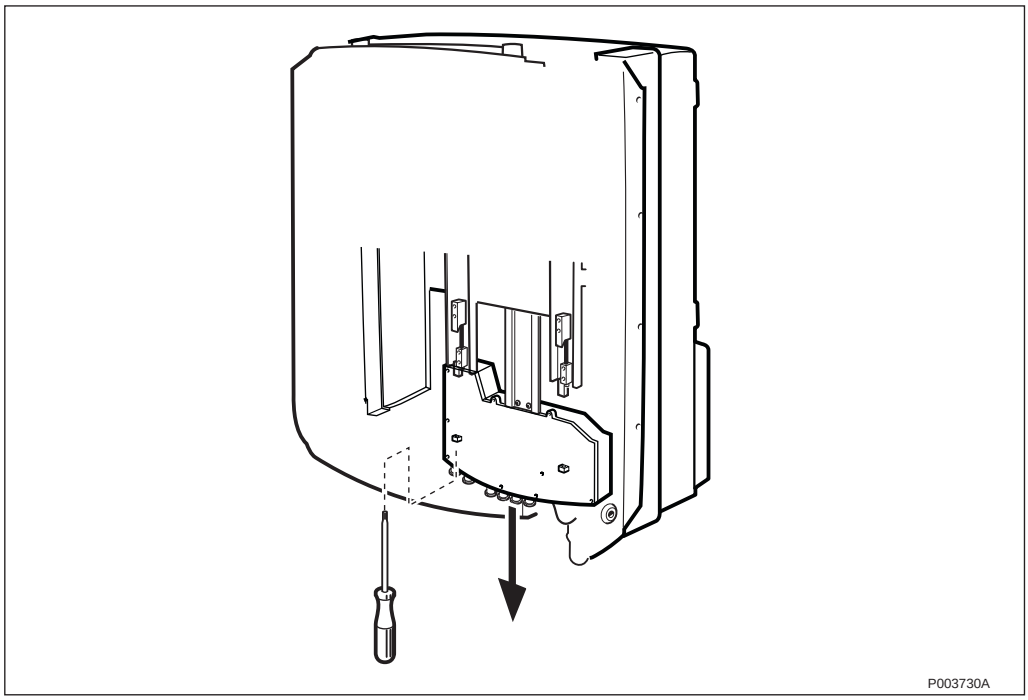

Figure 408 Loosening the interface box

1. Loosen the two torx screws on the cover of the interface box, and pull down the interface box.

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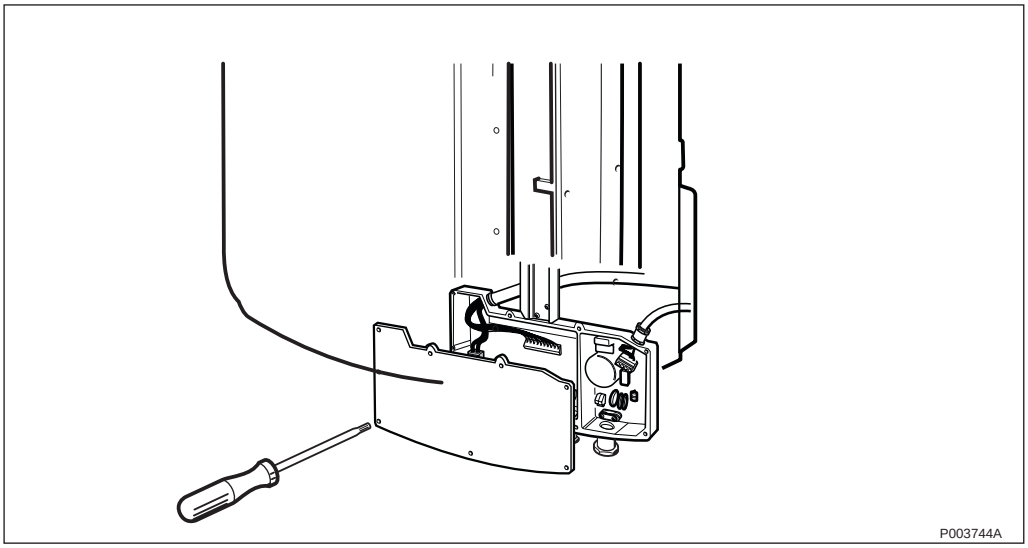

Figure 409 Loosening the interface box cover

2. Open the cover of the interface box by loosening the 9 torx screws.

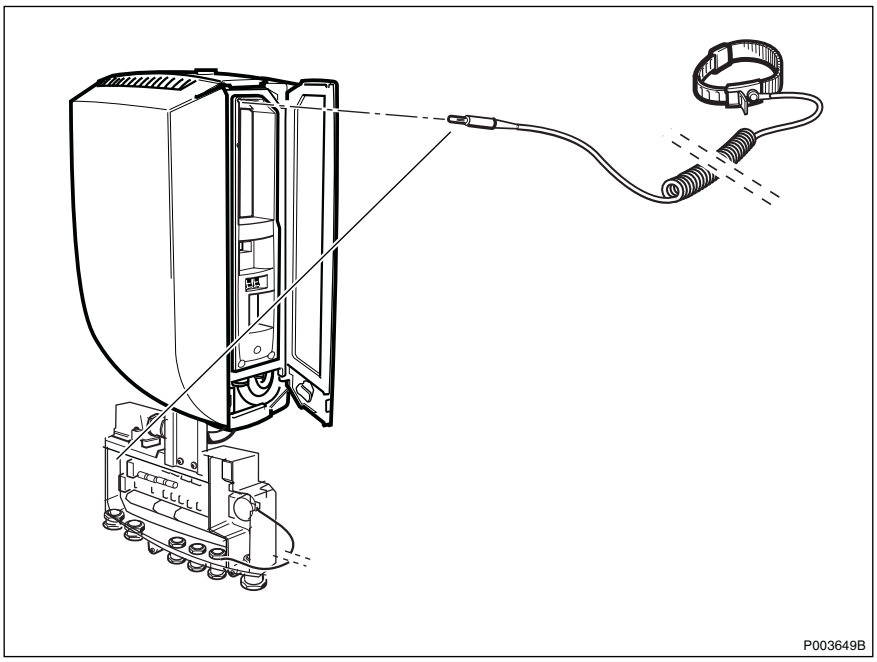

Figure 410 Connecting the ESD wrist strap

3. Connect the ESD wrist strap to the ESD connection point in the installation box.

4. Remove the connection terminal blocks connected to the AC board.

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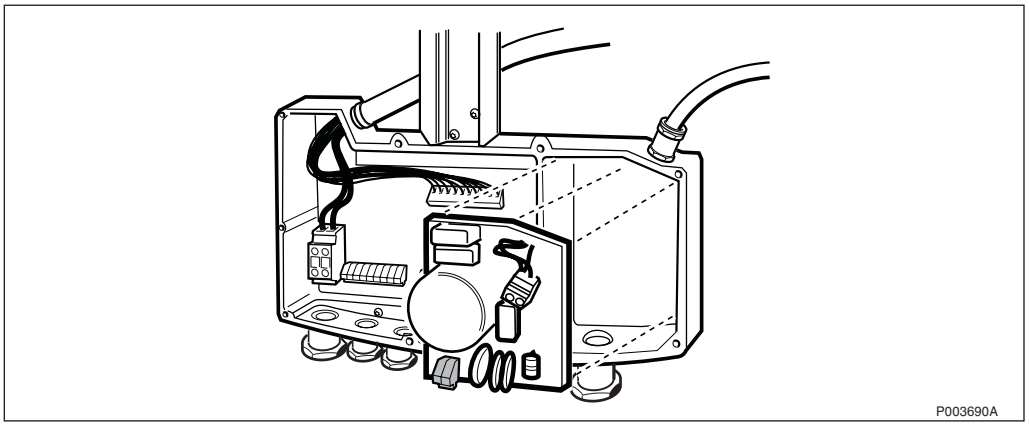

Figure 411 Removing the AC board

5. Remove the Protective Earth from the installation box.
6. Unscrew the six torx screws holding the AC board.
7. Replace the AC board and remount the six screws, including the Protective Earth.
8. Remount the two AC connection terminal blocks.
9. Remove the ESD wrist strap.
10. Remount the cover of the interface box and tighten the screws.
11. Push up the interface box and secure it in the upper position with the two torx screws.

Set to Operation

1. Turn the AC Mains Power switch to ON position.
2. Switch the PBC AC switch to ON position.
3. Switch the PBC battery switch to ON position.
4. Switch the AC power switch on the RBS to ON position.
5. Switch the battery power switch on the RBS to ON position.
6. Set the RBS to Remote Mode.
7. Close the installation box doors.

Test after corrective action

1. Perform the checklist in *Section 12.9 on page 452*.

12.7 Preventive Maintenance for the RBS

This chapter provides information about the units requiring regular inspection and recommended intervals. Preventive Maintenance is performed to inspect and correct faults before they cause serious damage to the equipment.

The interval between inspections at each RBS site varies depending upon the environmental conditions found there. Outdoor sites are

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exposed to larger amounts of contaminants and, therefore, require more maintenance than indoor sites. The RBS operator can decide to increase or decrease the recommended interval between inspections as required.

RBS Maintenance Schedule

Table 68 Preventive maintenance table RBS

1) Inspect the sunshields	Every time the RBS unit is controlled or repaired
2) Clean the cooling flanges	3-5 years between cleaning
3) Exchange the batteries	Exchange batteries at 5 year intervals
4) Exchange the connection board	Exchange the connection at 10 year intervals
5) Exchange the transmission board	Exchange the transmission board at 10 year intervals
6) Exchange the AC board	Exchange the AC board at 10 year intervals
7) Internal synchronisation (optional)	Calibrate at 3 year intervals
8) Inspect the Fan Unit (optional)	Every year

12.7.1 Sunshields

To exchange the sunshields, *see Section 12.5.3 on page 357*.

Table 69 Checklist Sunshield

Checklist	**Yes**	**No**	**Need of repair**
1) Are the sunshields dirty?			
2) Are the sunshields damaged?			
3) Are the sunshields discoloured?			
4) Are the sunshields mounted correctly?			
Signature:			
Date:			

Corrective actions

1. Clean the sunshield with a mild detergent.
2. Exchange the sunshields if they are damaged, discoloured or deformed due to high temperature.

12.7.2 Internal Battery

The internal battery is guaranteed to last six years from the manufacturing date (year-week) on the battery label. Replace the battery before the date expires (manufacturing date + six years). Depending on the circumstantial facts (like temperature, frequent power failures etc.) at the site, the maintenance period may need to be shortened. *See Section 12.5.8 on page 373*

12.7.3 Cooling flanges

1. Remove the sunshields, *see Section 12.5.3 on page 357*.

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2. Clean the cooling flanges on the front with a soft brush.
3. Clean the sunshield, if necessary.
4. Clean the cooling flanges on the back of the radio cabinet.

12.7.4 Connection Board

To exchange the RBS Connection board, *see Section 12.5.13 on page 387*.

12.7.5 Transmission Board

To exchange the RBS transmission board, *see Section 12.5.14 on page 393*.

12.7.6 AC Board

To exchange the RBS AC board, *see Section 12.5.15 on page 397*.

12.7.7 Internal Synchronization (optional)

The purpose of calibrating the 13 MHz oscillator is to aviod the high risk of traffic disturbances. This has to be done every third year.

It is not necessary to take the RBS out of service in order to perform the calibration.

Tools and Instruments

For information about required test equipment and tools *see chapter Tools and Instruments.*

Test preparations

- The RBS must be loaded with BSS R7 SW or higher and must be Operational.
- The cell must have been in active state for at least one hour. The RBS contains an owenoscillator that has to be warmed up to become stabil.

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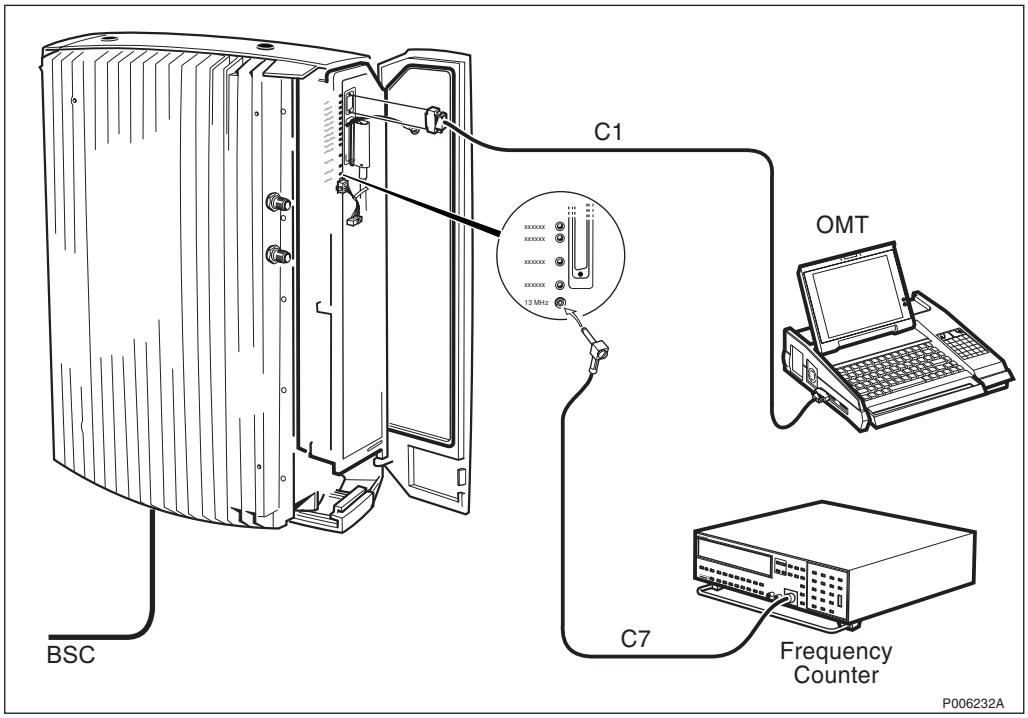

Figure 412 Testbed configuration

5. Connect the OMT cable (C1) from a PC COM-port to the RBS according to the figure above.
6. Connect the cable (RPM 113 77 2) from port A on the frequency counter to the 13 MHz port in the User Interface according to the figure above.

The MO TF (RBS) must be syncronised to the optional reference oscillator. This is done by preforming step 3-6.

7. Enter the command RXMOP:MO=RXOTF-x;
8. Read the value (INTI, INTE, PCM or DEFAULT) of parameter SYNCSRC an write it down.

If the value is INTE, proceed with *Section Calibration of the 13 MHz oscillator on page 449*, else proceed with step 5-6.

9. If the value is not INTE enter:

   RXMSC:MO=RXOTF-x, TFMODE=SA, SYNCSRC=INTE;

10. Enter the command RXMOP:MO=RXOTF-x; again and make sure that the value of the parameter SYNCSRC is INTE.

Calibration of the 13 MHz oscillator

Before starting the calibration the IDB must be checked and read with OMT.

Perform the calibration, for futher information see:

OMT User's Manual *LZN 302 01*

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Wait until the locked LED on the frequency counter (FC) is lit. It takes about 15 minutes before the FC is ready for operation. Do not start to measure the frequency before the warm-up period is ended.

1. Set level trig in mode auto.
2. Set sample size to 10 seconds and in mode mean.
3. Measure the frequency during 5 minutes.
4. Enter the mean frequency (with an accuracy of 1/1000 Hz) into the OMT.
5. Wait 10 minutes and measure the frequency again during 5 minutes. If the frequency deviate more than 208 mHz (16 ppB) from 13 MHz repeat step 5.

The calibration is finished.

Restore the BSC

If the parameter SYNCSRC value was not INTE, *see step 8 on page 449*, enter:

RXMSC:MO=RXOTF-x, TFMODE=SA, SYNCSRC=[original value].

12.7.8 Fan Unit (optional)

Note: *See Section 12.5.2 Fan Unit (Optional) on page 352* for taking the RBS and Fan Unit out of service.

Table 70 Preventive maintenance table Fan Unit

1) Inspect the Fan Unit cover to see that it is not damaged or dirty	Every time the RBS is controlled or repaired
2) Inspect the fans to see that they are clean and that no obstacles are blocking the airflow	Every time the RBS is controlled or repaired

Corrective actions

6. Replace the cover if it is damaged.
7. Clean the cover with a mild detergent.
8. Clean the fans with a mild detergent.
9. Remove any obstacles blocking the air flows.

Test after corrective actions

Run all the three fans to see that they operative. If not replace the Fan Unit according to *Section 12.5.2 Fan Unit (Optional) on page 352*.

12.8 Preventive Maintenance for the PBC

This chapter provides information about the units requiring regular inspection and recommended intervals. Preventive Maintenance is performed to inspect and correct faults before they cause serious damage to the equipment.

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The interval between inspections at each RBS site varies depending upon the environmental conditions found there. Outdoor sites are exposed to larger amounts of contaminants and, therefore, require more maintenance than indoor sites. The RBS operator can decide to increase or decrease the recommended interval between inspections as required.

PBC Maintenance Schedule

Table 71 Preventive maintenance table PBC

1) Inspect the sunshields	Every time the PBC unit is controlled or repaired
2) Clean the cooling flanges	3-5 years between cleaning
3) Exchange the batteries	Exchange the batteries at 5 year intervals
4) Exchange the EMC board	Exchange the EMC board at 10 year intervals
5) Exchange the DC Surge board	Exchange the DC surge board at 10 year intervals
6) Exchange the AC board	Exchange the AC board at 10 year intervals

12.8.1 Sunshields

For information regarding exchanging sunshields, *see Section 12.6.1 on page 409.*

Table 72 Checklist sunshield

Checklist	**Yes**	**No**	**Need of repair**
1) Are the sunshields dirty?			
2) Are the sunshields damaged?			
3) Are the sunshields discoloured?			
4) Are the sunshields mounted correctly?			
Signature:			
Date:			

Corrective actions

1. Clean the sunshield with a mild detergent.
2. Exchange the sunshields if they are damaged, discoloured or deformed due to high temperature.

12.8.2 Cooling flanges

1. Remove the sunshields, *see Section 12.6.1 on page 409.*
2. Clean the cooling flanges on the front with a soft brush.
3. Clean the sunshield, if necessary.
4. Clean the cooling flanges on the back of the battery cabinet.

12.8.3 Batteries

For information regarding exchanging the batteries, *see Section 12.6.2 on page 416.*

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Table 73 Battery checklist

Checklist	Yes	No
1. Are the batteries and battery compartment free from dirt, excessive grease, oxidation and corrosion?		
2. Is the battery compartement free from discolouration and not deformed?		
3. Are the batteries still within its replacement date?		
4. Are the batteries leaking acid?		
Signature:		
Date:		

Corrective actions

1. Clean the batteries and battery box with a mild detergent and a soft brush. Remove oxidation and corrosion.
2. If the batteries are deformed or discoloured, exchange the batteries.
3. If the battery poles are damaged, exchange the batteries.
4. Exchange the batteries if the *Use before* date has passed.

12.8.4 EMC Board

To exchange the PBC EMC board, *see Section 12.6.6 on page 437*.

12.8.5 DC Surge Board

To exchange the PBC DC Surge board, *see Section 12.6.7 on page 440*.

12.8.6 AC Board

To exchange the PBC AC board, *see Section 12.6.8 on page 443*.

12.9 Concluding Routines

The following checklist is not mandatory but strongly recommended. Local procedures and safety regulations must be evaluated and incorporated into this checklist.

If the answer to any of the items is NO, do not leave the site until the problem/fault has been cleared or investigated.

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Table 74 Checklist

Checklist	**Yes**	**No**
1. Red fault indicator off?		
2. Operational indicator (green LED) lit?		
3. RBS in remote mode? (Yellow local mode on DP is off)		
4. Other yellow indicators OFF?		
5. External alarm OFF? (Yellow)		
6. Cabinet locked?		
7. Is the backup copy of the RBS IDB saved on a floppy disk?		
Signature:		
Date:		

12.9.1 Transport of a Faulty Unit

The faulty unit should be transported in the same packaging materials as the spare unit was delivered in.

12.9.2 Report of Finished Work

When a maintenance procedure has been completed, a report should be written including a detailed description of actions taken, all observations made in accordance with local routines for work orders, site log-book, etc.

12.9.3 Repair Delivery Note - “Blue Tag”

When a faulty unit is returned, it must always be accompanied by a repair delivery note. When the repair delivery note has been completed it must be attached to the faulty unit before sending it for repair.

The repair delivery note (LZF 084 84) can be ordered from the local FSC. A description of how to fill in a repair delivery note follows below.

Note: Add as much information as possible to Field 20 on the Repair Delivery Note to make it easier for the repair center.

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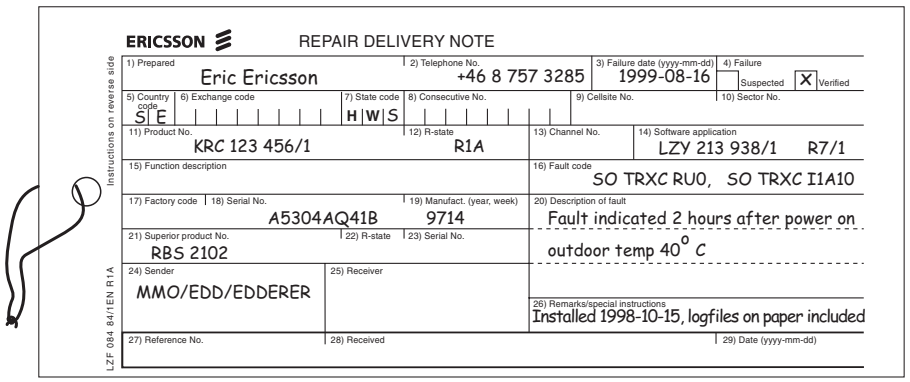

The following fields are mandatory. Use block letters.

1	Prepared	Service technician´s name
2	Telephone	Service technician´s telephone number
3	Failure date	
4	Failure	Mark with an X if failure is Suspected or Verified
5	Country code	Two letter country code
7	State code	Hardware (HW) status when failure occurred: S = Unit in service when failure occurred (Repair) T = New unit failed during installation or test (Claim) R = Repaired unit failed during installation or test (Claim or Repair)
11	Product No.	Faulty unit
12	R-state	Faulty unit
14	Software application	RBS load, product number and R-state
16	Fault code	Check OMT or work order
18	Serial No.	Faulty unit
19	Manufact. (year week)	
20	Description of fault	Observations and external factors
21	Superior product No.	RBS type
24	Sender	Customer, Company, Corporate ID
26	Remarks/special instructions	Information about installation date, logfiles and modification requirements

P005537C

Figure 413 The “Blue tag”

OMT fault log

If there is a OMT fault log, it should be sent in with the “Blue Tag” on the faulty unit.

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13 Product Data

This chapter describes the hardware units for a RBS 2302 site. It will form a basis for the site requirements. Additional information can be found in:

Reference Manual *LZN 302 77*

13.1 Radio Base Station RBS 2302

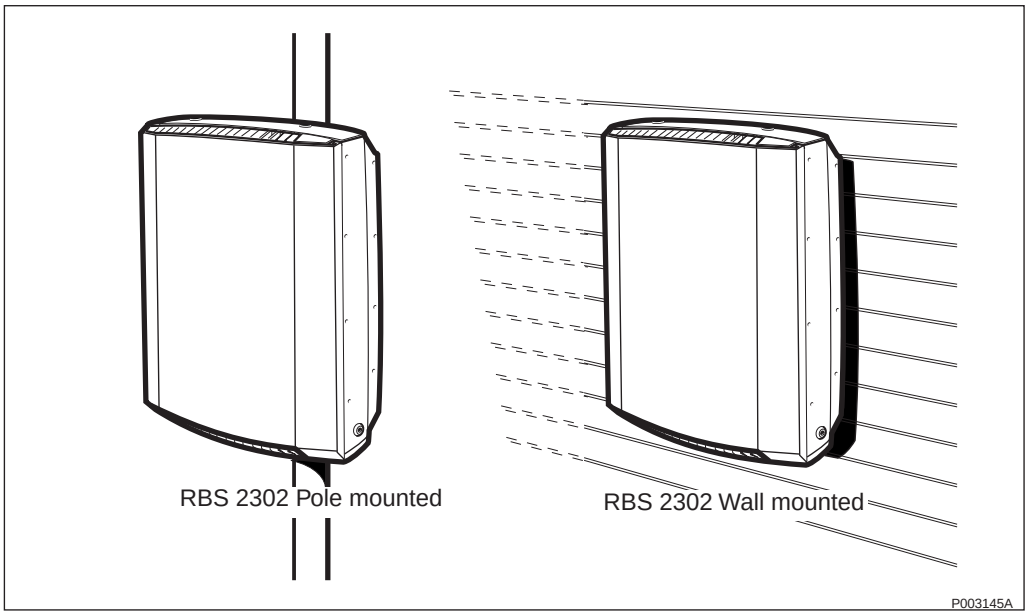

Figure 414 RBS 2302

RBS 2302 is a member of the RBS 2000 family of base stations. It is a small "Micro base station" that can be placed in both outdoor and indoor environment.

The base station contains one or two low-power transceivers, and can be equipped with integrated antennas. Integrated sector or omnidirectional antennas are available for that purpose.

The purpose of the RBS as a stand alone product is to supply "hot spot" capacity in small areas.

Versions are available for the 900, 1800 and 1900 MHz bands.

The RBS consists of the following main units:

- Mounting base
- Cabinet
- Antenna options:
  - omnidirectional antenna unit
  - sector antenna unit
  - multicasting box

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- Sunshields

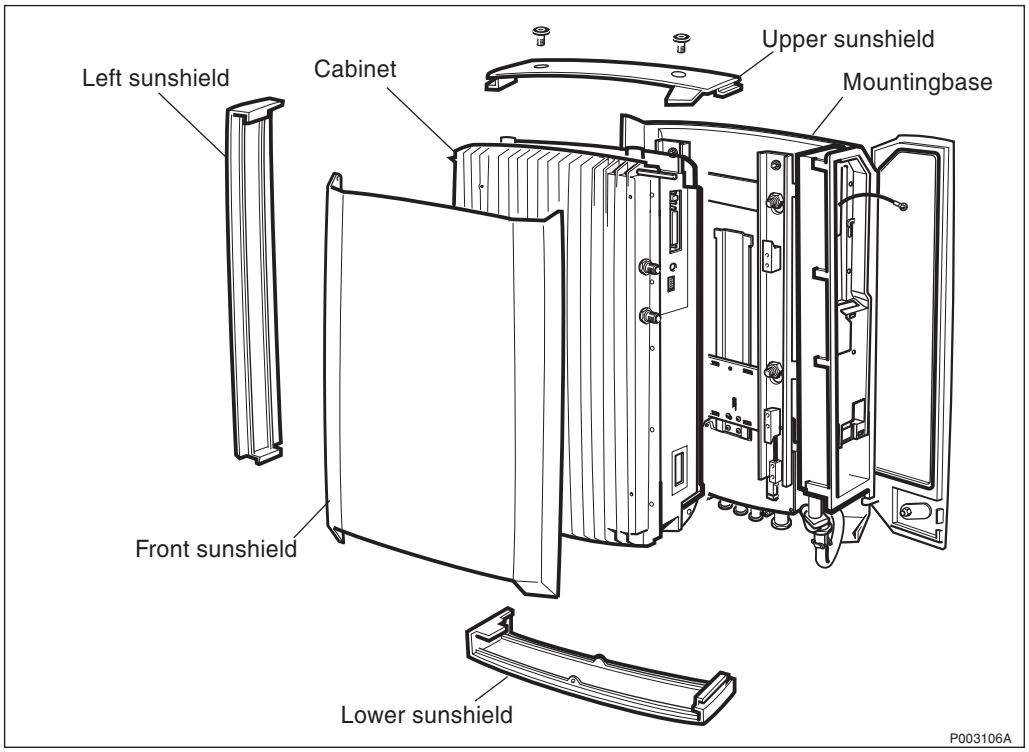

Figure 415 Main units

13.1.1 Wall Mounting

The mounting plate is used to fix the base station to a flat surface. In combination with the pole fixture it is also used to install the base station on a pole.

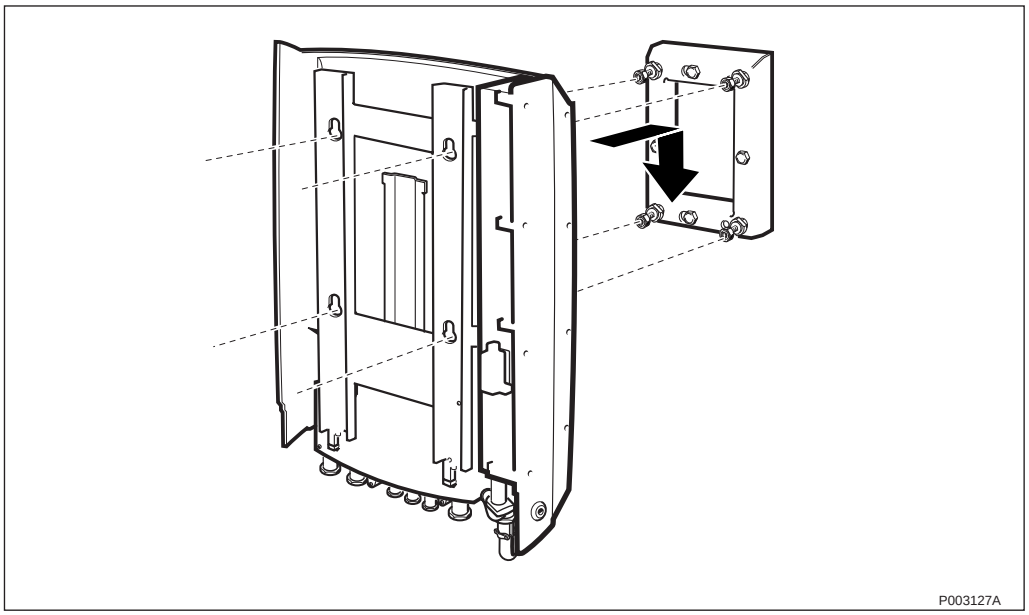

Figure 416

A separate template is available to mark out holes for drilling.

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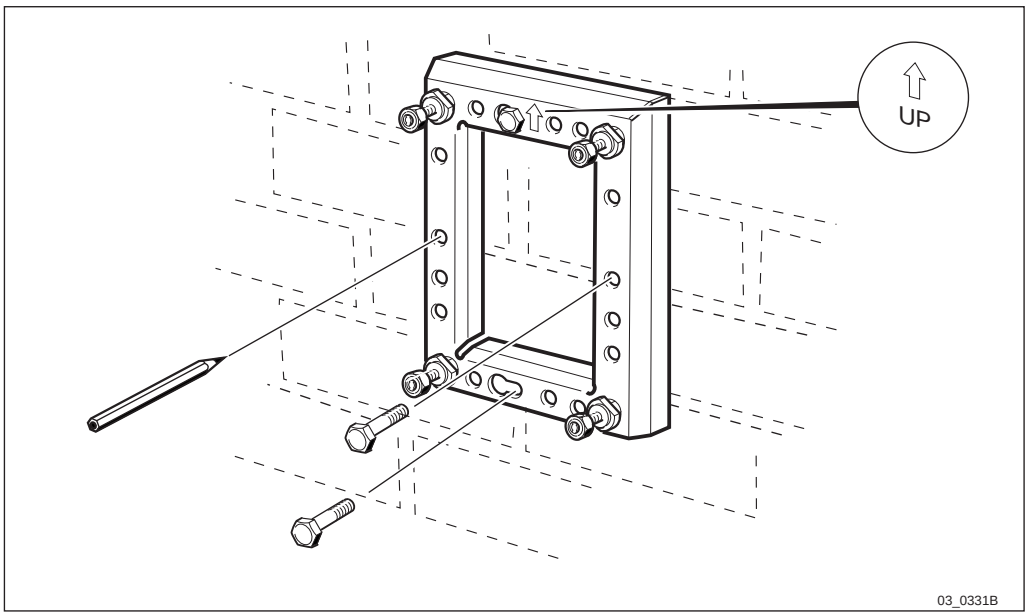

Figure 417 Mounting plate

13.1.2 Pole Mounting

The pole fixture is attached to the mounting plate if the base station is to be mounted on a tubular mast or pole. The pole fixture will attach to a round tube having a diameter of 60–114 mm.

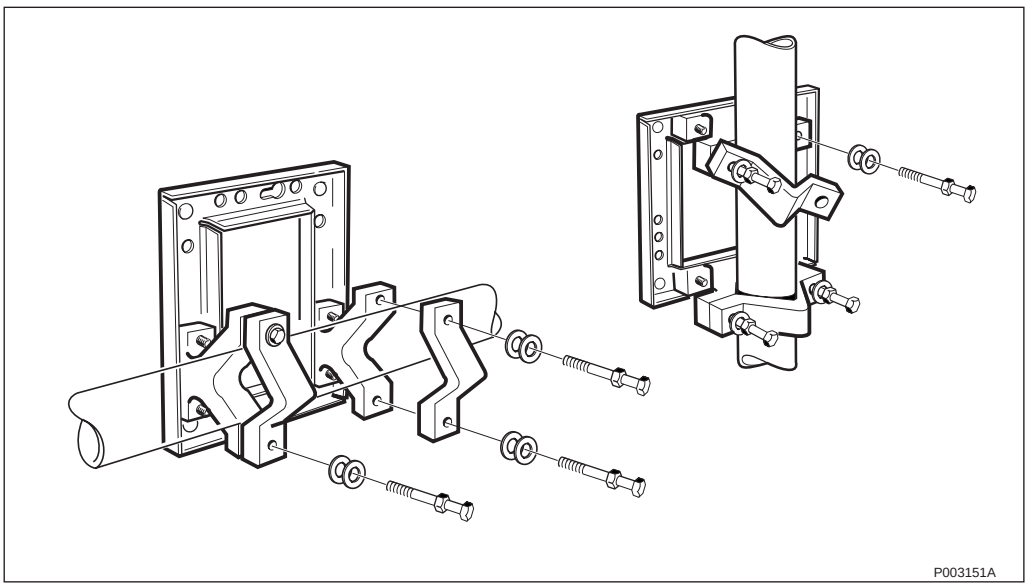

Figure 418 Pole fixture and mounting plate mounted on a tube

13.1.3 Optional Fan Unit

A fan unit is available as an option. This unit will increase the high temperature endurance for the base station to +55 °C. The fan unit is installed on top of the RBS cabinet. It has its own mains cable that shall be connected to AC mains.

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The Fan Unit should be provided with its own mains switch. Otherwise it will be necessary to switch off the supply to the entire base station when the Fan Unit is replaced.

The fan unit can be connected to the same supply voltages as the RBS 2302. A switch is provided to set the supply voltage range to 230 V or 115 V. The power consumption is less than 20 VA.

The fan unit will switch on if the ambient temperature is above +40 °C. It will switch off if the ambient temperature falls below +35 °C.

The Fan Unit has one alarm connection, which will occupy one of the external alarm connections. The Fan Unit will increase the height of the RBS 2302 with 115 mm.

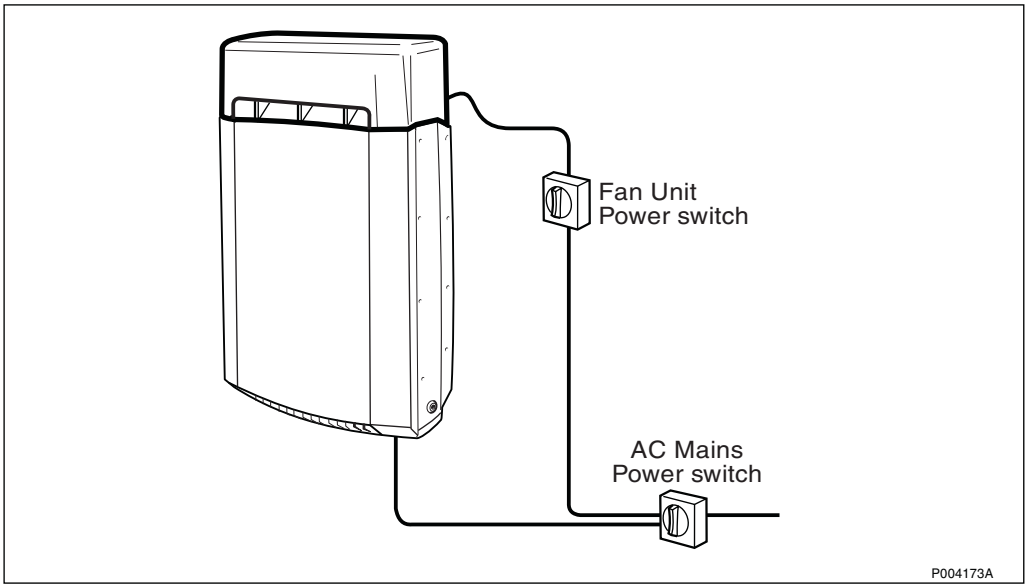

Figure 419 Fan unit

13.1.4 Optional HDSL transmission module

The RBS 2302 can be fitted with an optional HDSL (High-bit rate Digital Subscriber Line) modem module, fitted in a modified mounting base door. A description of installation of the HDSL modem is included in *chapter Installation of RBS 2302* and the technical description is presented in *Section 13.3 HDSL Modem on page 473*.

The HDSL module may use two of the external alarms. In release R7 two external alarms are dedicated for optional HDSL usage. To use the two external alarms for HDSL purpose is defined by setting of a switch on the HDSL module.

13.1.5 Lifting Kit (optional)

A lifting kit is available as an option.

Note: The Lifting Kit cannot be attached to the mounting fixture when it is mounted on a horizontal tube as shown to the left in *Figure 418 on page 457*. The mounting holes for the lifting kit are blocked by the pole fixture.

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Note: The Lifting Kit is designed to lift maximum 25 kg (55 lbs). It is not designed to lift the PBC cabinet assembled with batteries.

For more information about using the Lifting Device *see chapter Installation of RBS 2302*.

13.1.6 Dimensions and Weight

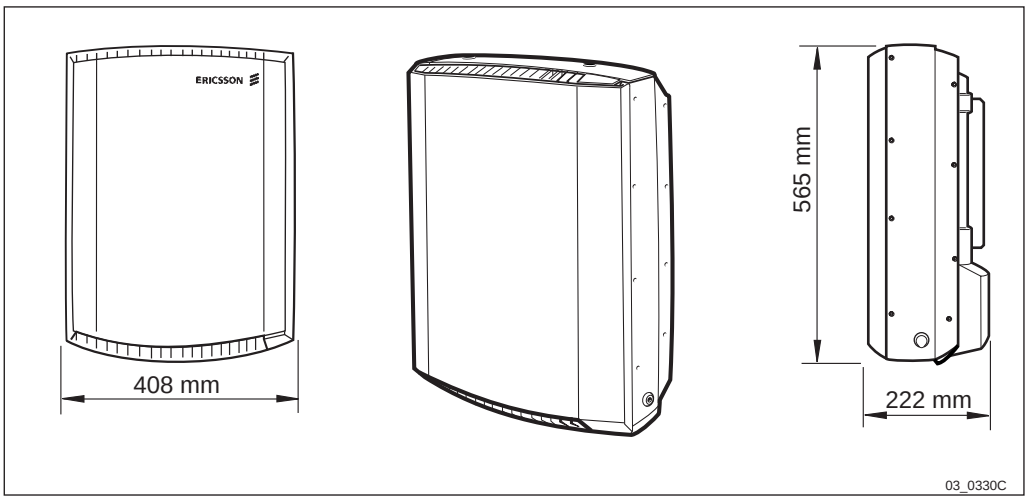

Figure 420 Dimensions

Table 75 Weights

Cabinet	18 kg	40 lb
Mounting base	8 kg	18 lb
Wall and pole mounting details	5 kg	11 lb
Total weight	31 kg	69 lb

13.1.7 Space Requirements

Free space is required around the base station for installation and maintenance. When more than one cabinet is installed at the same site, a certain distance between the cabinets is required for antenna isolation and to provide sufficient working space.

Furthermore, integrated antennas require that no large objects are situated in front of the antenna obstructing the radio beam.

The cabinet must always be installed vertically and with the cable inlets down.

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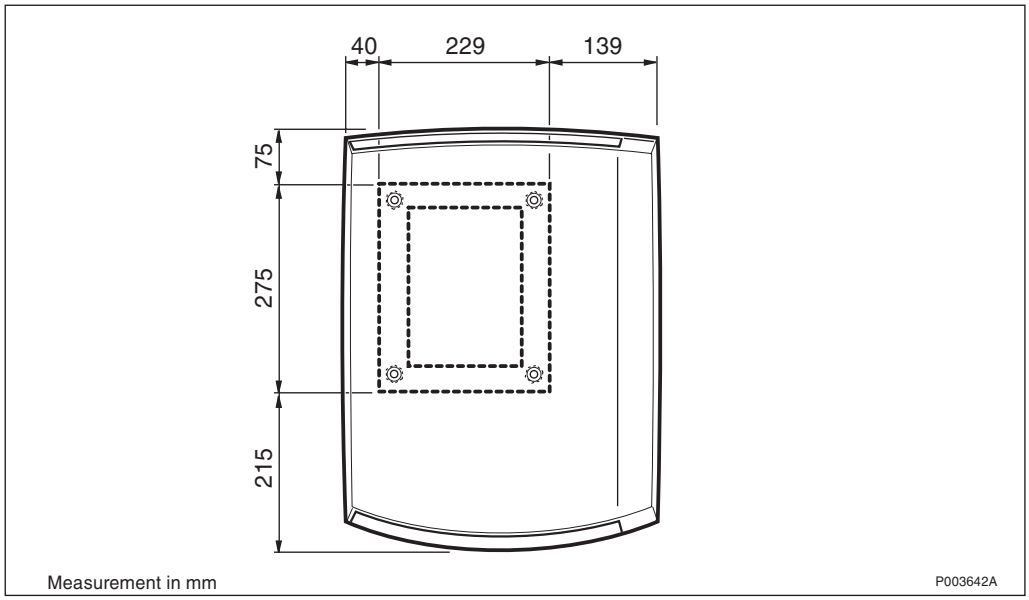

Figure 421 Mounting plate and equipment contour

Figure 421 on page 460 shows the dimensions of the equipment in relation to the mounting plate. This is to determine a suitable alignment with several units or existing equipment.

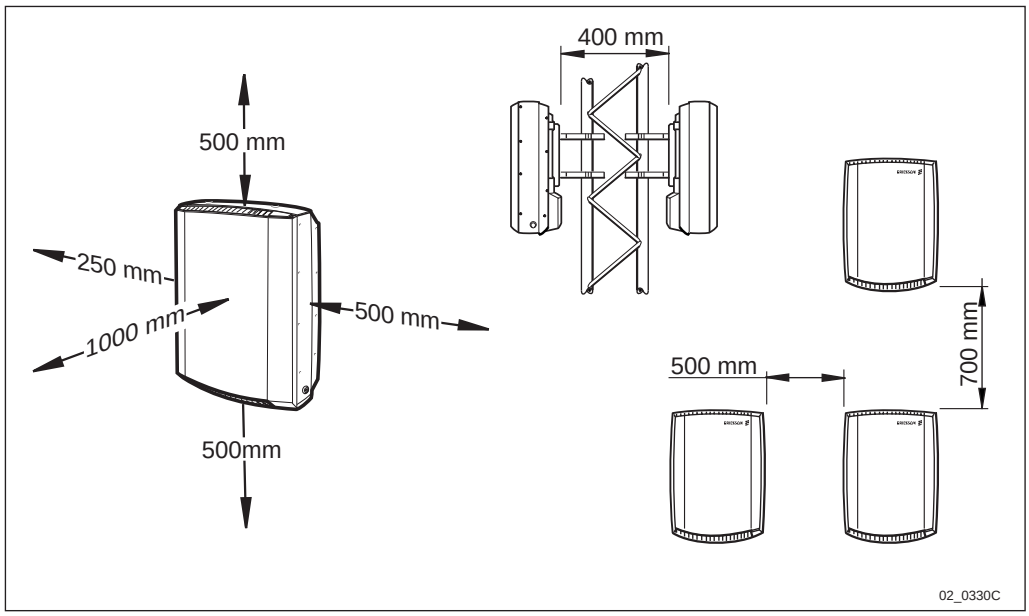

Figure 422 RBS 2302 space requirements

The maximum distance between two RBS 2302 in a 4 TRX and 6 TRX configuration is limited by the length of the TXL-bus cable. The maximum length of the TXL-bus cable is 5 m.

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13.1.8 Climatic Endurance

Table 76 Climatic endurance

Environmental parameter	Units	Normal condition	Non–destructive
Temperature	$^{\circ}C$	-33 - +45	-40 - +70
Relative humidity	%	15 - 100	15 - 100
Solar radiation	W/m^2	1120	1120
Design wind speed	m/s	50	50

Normal condition denotes the environmental conditions where all units will function as specified.

Non-destructive range denotes environmental stress above the limits for normal operation during which no function is guaranteed and performance may degrade in an unspecified manner. When the environmental stress is over and the environment has returned to normal conditions, no manual intervention on the site is required to restore full performance of the base station.

Non-destruction refers to a period of not more than 96 consecutive hours, and a total of not more than 5.5 days in a three-year period.

13.1.9 Vibrations

The base station withstands vibrations below 0.5 G and shocks below 25 G.

13.1.10 Acoustic Noise

The base station does not emit any acoustic noise.

13.1.11 Power Supply

The RBS can be connected to the nominal mains supply voltages in *Table 77 on page 462*.

The base station shall be connected to a dedicated circuit in the power distribution board. The circuit shall be fused with a single fuse if the circuit is between phase and neutral and two fuses if the circuit is between two phases.

Note: All units must be connected to the same phase.

Note: Fuse value must not exceed 10 A.

The power distribution cable shall have two power supply conductors and one protective earth conductor. Conductor size and distribution fuse(s) must be according to applicable electrical regulations.

Connections are made on terminals in the interface box on the mounting base. The terminal will accept wires having a maximum area of 2.5 mm^2.

The mains voltage is connected between two of the terminals. The third terminal is a screw terminal on the body, used for protective earth.

The cable gland has capacity for one power cable with an outer sheath diameter of 7 – 15 mm.

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Note: A lockable mains switch must be provided close to the base station. It is also recommended that an AC mains outlet is mounted close to the base station, for installation and test equipment.

Supply Voltage

Table 77 Supply voltages

Voltage	Tolerance	Frequency
200 - 250 V AC	± 10 %	50 Hz ± 10 %, 60 Hz ± 8 %
100 - 127 V AC	±10 %	60 Hz ± 8 %

Limiting Values for AC Mains Supply

Table 78 Limiting values

Non destructive range	Value
Permanent	0 V-280 V
Overvoltage < 10 ms	280 V-300 V
Pulses < 50µs	6 kV

The mains voltage level is selected by a switch in the installation box. The voltage selector can be set to a nominal voltage of 115 V or 230 V.

Table 79 Power consumption and heat generation

Operation	Power consumption (VA)	Heat generation (W)
Normal operation[1)]	150	90
Maximum[2)]	400	350

[1)]Both transceivers transmitting on full output power.

[2)]With activated heater.

13.1.12 Battery Backup

The base station will survive interruptions in the mains supply for at least 3 minutes. The base station will maintain full performance during the back-up time if the battery is fully charged. The battery will be recharged to at least 80 % of its capacity within 15 hours.

The battery consists of two rows of nickel-cadmium cells in a sealed container. The size of the internal nickel-cadmium cells is similar to ordinary torch battery type R14 (IEC-standard) or C (ANSI-standard).

It is not possible to open the battery container.

The base station can also be powered with 24 V DC from the PBC. In this case the battery container is replaced by a battery adapter, *see Section Batteries on page 472*. However, the radio cabinet cannot be powered up with batteries (24 V DC) only.

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13.1.13 Earthing

The mounting base has one earthing point. The earthing point is a M8 bolt. A suitable earthing kit must be used to connect the bolt with the lightning protection system of the site.

13.1.14 Transmission

The base station can be connected to transmission interface G.703, type E1 (2 Mbit/s) or T1 (1.5 Mbit/s). T1 is also called DS1.

For E1 transmission interfaces, different impedances are used by different network operators or in different applications, such as indoor or outdoor networks. The two types are unbalanced coaxial cable with 75 Ω impedances or balanced twisted pair cable with 120 Ω impedance.

For T1 transmission interfaces , balanced twisted pair cable with 100 Ω impedance is used.

In the base station there are two ports, PCM-A and PCM-B. With E1 and T1 transmission each port consist of one input and one output connector:

- PCM-A IN

  PCM-A OUT

- PCM-B IN

  PCM-B OUT

The OUT connectors transmit signals from the RBS. On the IN connectors the RBS receives signal. This is valid for E1 and T1 interfaces but not for HDSL.

The PCM-A port shall always be connected to the transmission cable towards the BSC. In cascaded configurations, the PCM-B is connected to the transmission cable going away from the BSC, that is, to the next base station.

In stand alone configuration, only the PCM-A ports are used. The PCM-B IN port has then to be terminated with a resistor between 10-100 Ω.

Type of Interfaces

- Tail cable for 75 Ω unbalanced line. Provided with TNC-female connectors. Connected to a terminal block in the interface box.
- Balanced line is conneced directly to a terminal block in the interface box.

Terminators

A terminating resistor is mounted on the terminal block in the interface box. This resistor terminates the PCM-B port. The terminating resistor in the interface box is removed when the PCM-B connection is used.

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Cascading

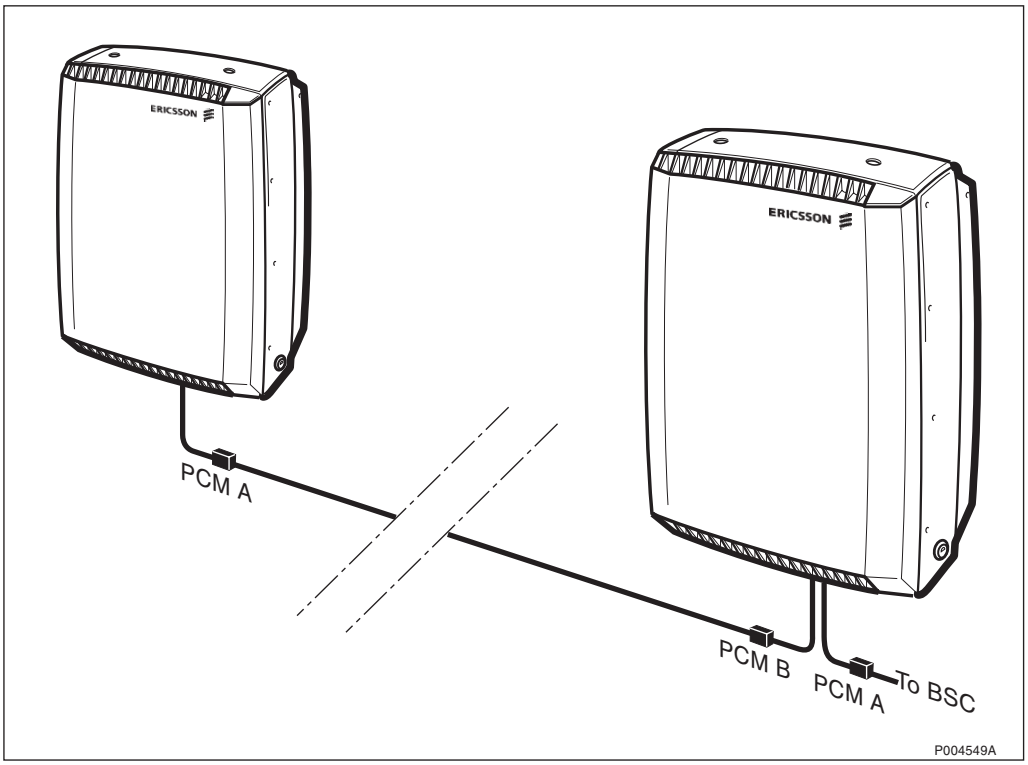

Figure 423 Cascaded cabinets

RBS 2302 can be cascaded. This means that the unused time slots from the first base station in a chain are cascaded to a second base station located at some distance from the first one.

The cable to the next base station in the chain is connected to the PCM-B port. The terminator is not mounted in this case.

Incoming cable from the previous base station in the chain is connected to PCM-A port. The distance between terminals depends on the type of cable or transmission media.

13.1.15 External Alarms

For supervision of external equipment, 8 external alarm circuits can be connected to a terminal block in the base station. Optional equipment will occupy the following number of circuits:

- PBC: 1 alarm circuit
- HDSL: 2 alarm circuits
- Fan Unit: 1 alarm circuit

Connections are made on terminals that will accept wires having an area from 0.5 - 2.5 mm^2.

The cable gland has capacity for one cable with an outer sheath diameter of 5 - 9 mm.

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The alarm detector connected to the terminals should be isolated relay contacts. A closed contact (logic zero) is required to be below 25 kΩ, and open contact (logic one) is required to be above 125 kΩ.

The current through a closed 0 ohm relay contact is between 0.05 and 0.07 mA during measurements, and less than 0.10 mA at all times.

The no load voltage between terminals is 18 to 24 V.

The external alarm inputs have overvoltage protection, which limits the voltage to 100 V relative to ground.

13.1.16 Antenna Connections

Internal and external antennas are connected to connectors behind the sunshield on the base station. The connectors are marked X2 and X3.

Table 80 Antenna connectors

Connector	**Duplex 1, 2 TRX**
X2	TX1/RXA
X3	TX2/RXB

The antenna connectors are of the TNC female type according to IEC 169-8.

When external antennas are used, a separate document shall be created for the site and included in the Site Installation Documentation. This document is numbered as an allocation drawing, 193 26-IPA.....

The base station has no space for connection of thick antenna cables. It is recommended to use a short 6 mm diameter jumper cable to join the base station with external antenna systems. Recommended jumper length is about 1 m, longer cables will add too much attenuation, especially at 1800/1900 MHz. For a suitable jumper cable see:

Ordering Information for RBS 2000 Installation Material *131 62-HRB 105 01/MA*

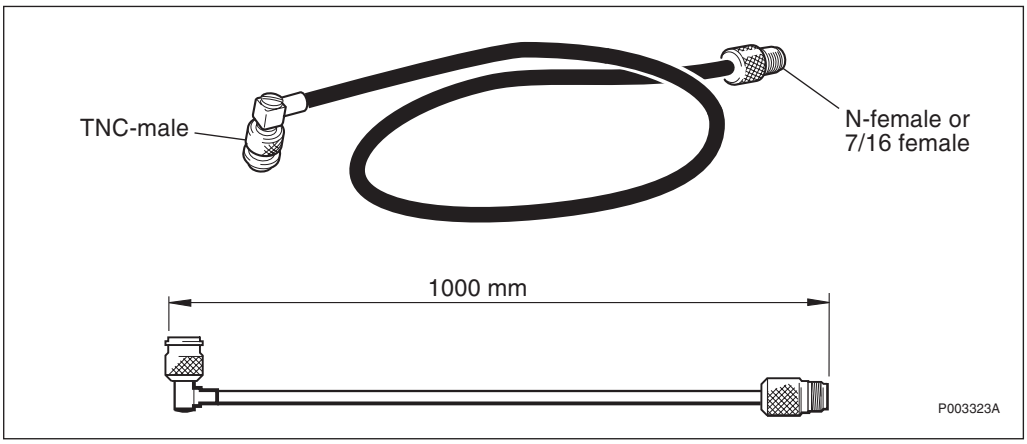

Figure 424 Jumper Cable, RPM 119 87/1

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13.2 Power and Battery Cabinet (optional)

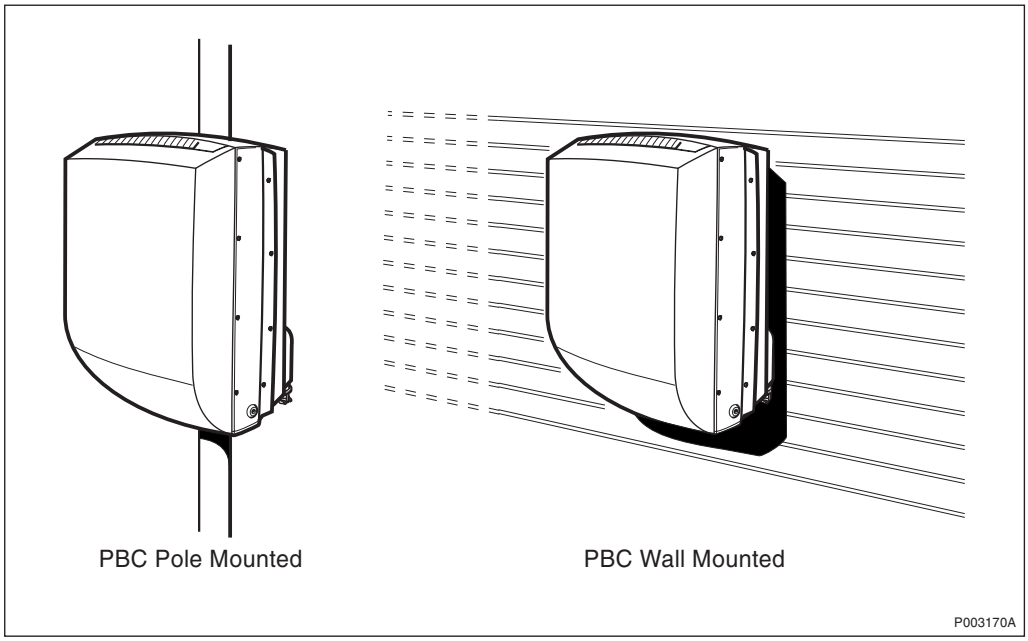

Figure 425 Power and Battery Cabinet

The PBC contains power supply for the active antenna, back-up batteries, DC/DC converter for back-up operation of RBS 2302 in case of power failure and alarm and control circuits for the active antenna.

The PBC consists of the following main units:

- Mounting base
- Cabinet
- Batteries – 4 pcs
- Sunshields

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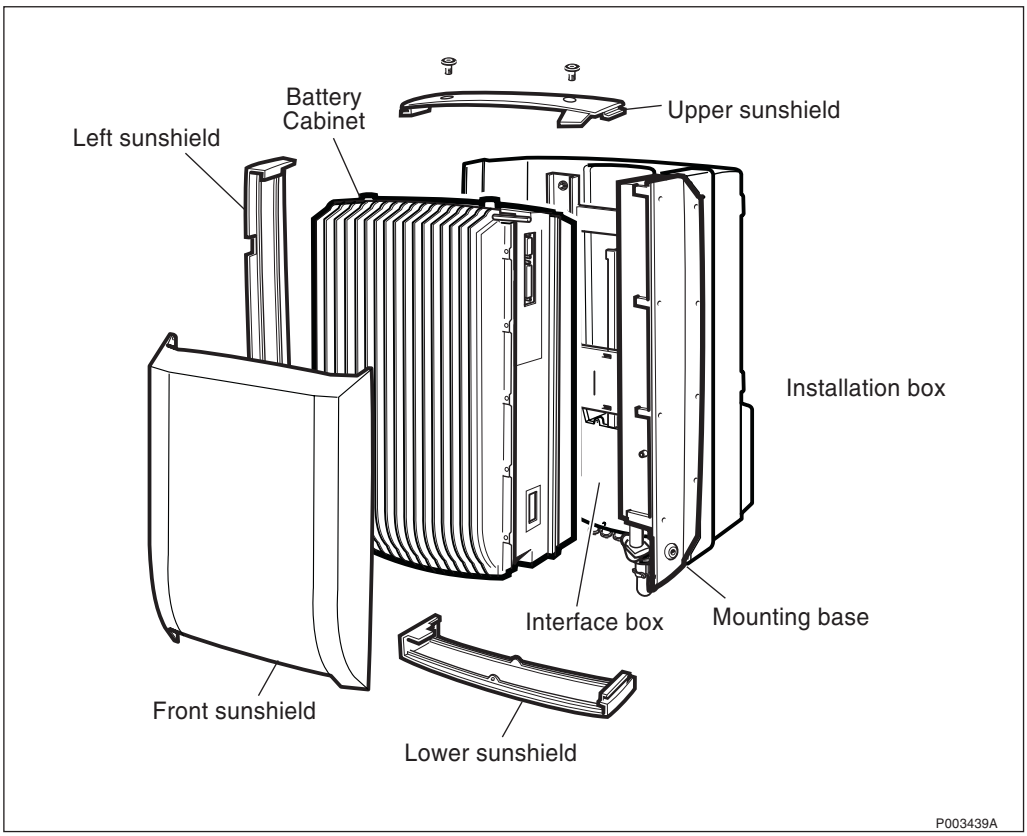

Figure 426

13.2.1 Wall Mounting

The mounting plate is used to fix the power and battery cabinet to a flat surface. In combination with the pole fixture it is also used to install the PBC on a pole.

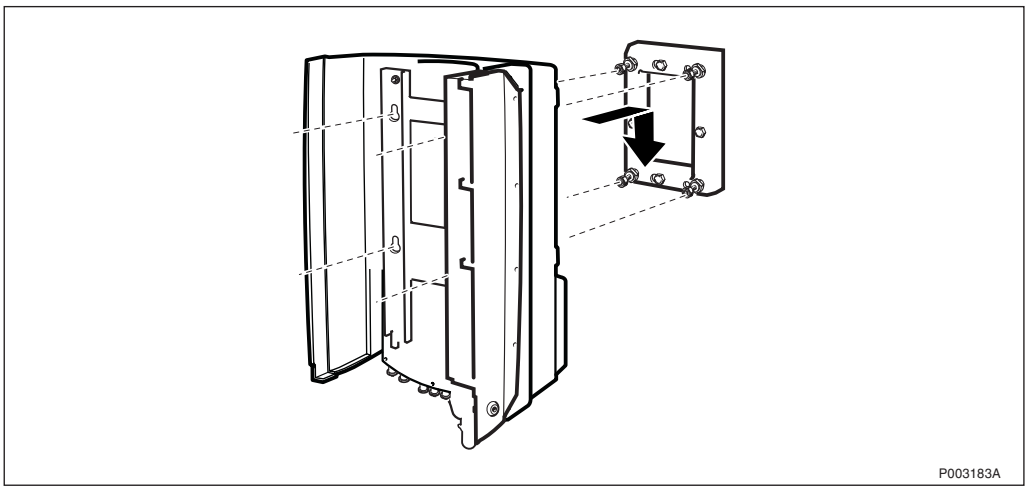

Figure 427 Mounting base and mounting plate

A separate template is available to mark out holes for drilling.

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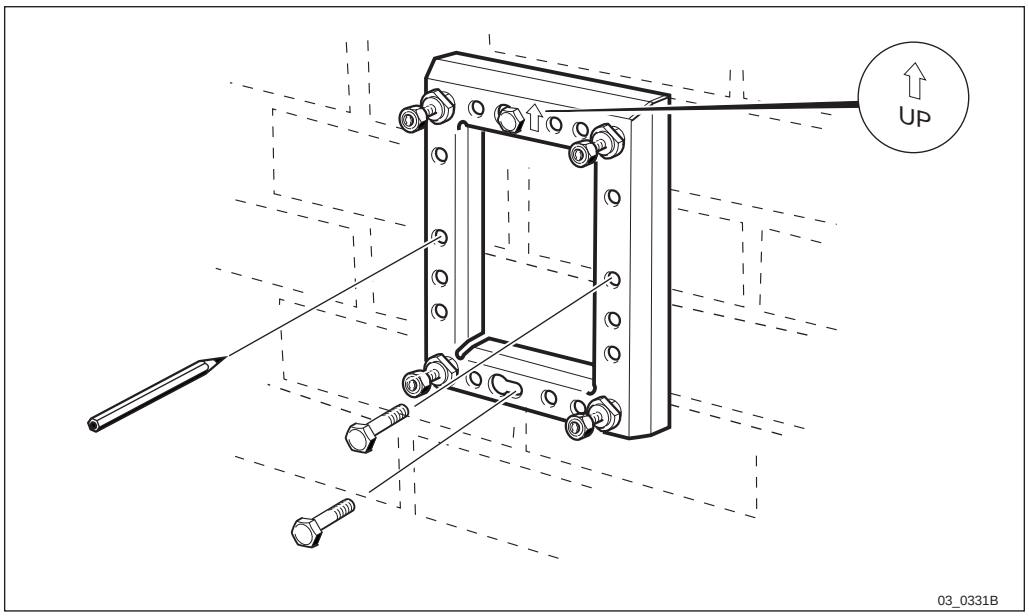

Figure 428 Mounting plate

13.2.2 Pole Mounting

The pole fixture is attached to the mounting plate if the PBC is to be mounted on a tubular mast or pole. The pole fixture is attached to a round tube having a diameter of 60–114 mm.

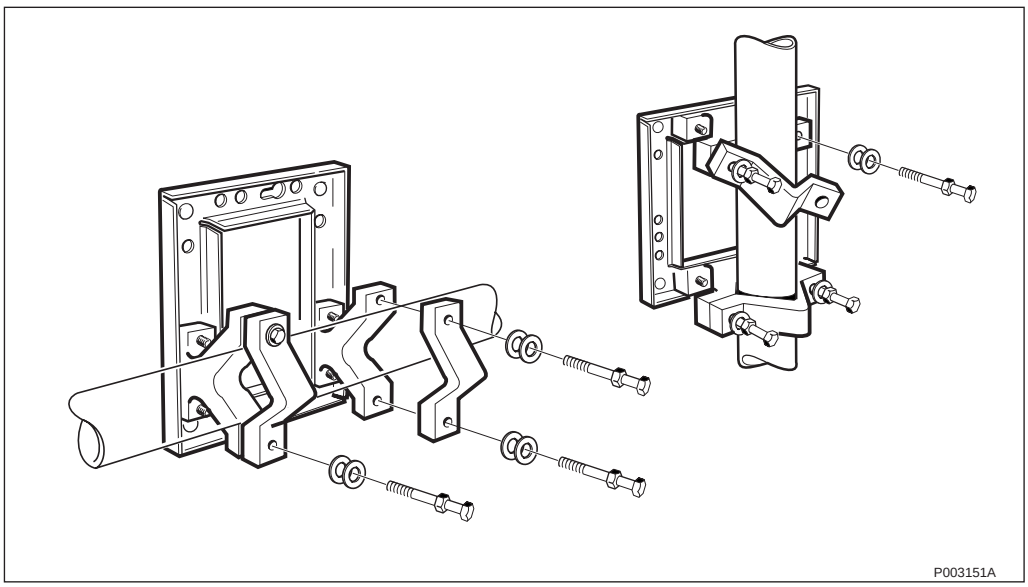

Figure 429 Pole fixture and mounting plate mounted on a tube

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13.2.3 Dimensions and Weight

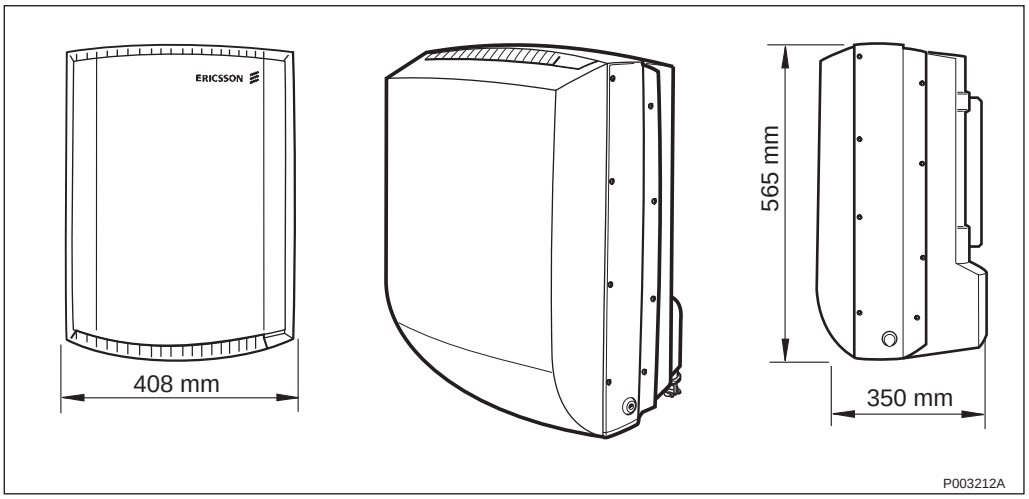

Figure 430 Dimensions

Table 81 Weights

Cabinet (no batteries)	23 kg	51 lb
Batteries	21 kg	46 lb
Mounting base	9 kg	20 lb
Wall and pole mounting details	6 kg	13 lb
Total weight	59 kg	130 lb

13.2.4 Space Requirements

Free space is required around PBC for installation and maintenance. When more than one cabinet is installed at the same site, a certain distance between the cabinets is required for air circulation and to provide sufficient working space.

The cabinet must always be installed vertically and with the cable inlets down.

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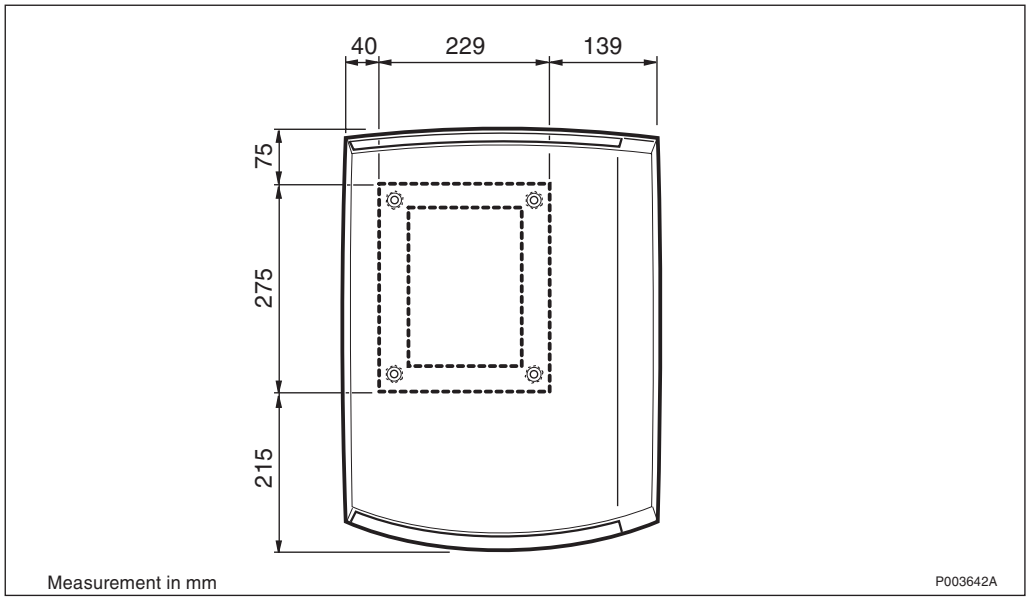

Figure 431 Mounting plate and equipment contour

Figure 431 on page 470 shows the dimensions of the equipment in relation to the mounting plate. This is to determine a suitable alignment with several units or existing equipment.

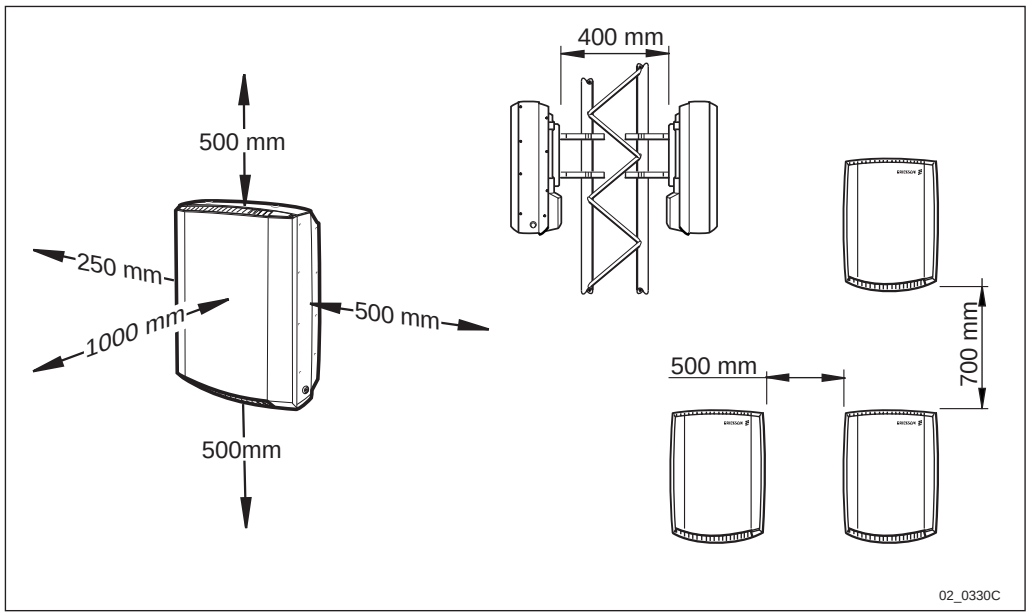

Figure 432 Space requirements for PBC

13.2.5 Climatic Endurance

Table 82 Climatic endurance

Environmental parameter	Units	Normal condition	Non–destructive
Temperature	°C	-33 - +45	-40 - +70
Relative humidity	%	15 - 100	15 - 100

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Solar radiation	W/m^2	1120	1120
Design wind speed	m/s	50	50

Normal condition denotes the environmental conditions where all units will function as specified.

Non-destructive range denotes environmental stress above the limits for normal operation during which no function is guaranteed and performance may degrade in an unspecified manner. When the environmental stress is over and the environment has returned to normal conditions, no manual intervention on the site is required to restore full performance of the base station.

Non-destruction refers to a period of not more than 96 consecutive hours, and a total of not more than 5.5 days in a three-year period.

13.2.6 Vibrations

PBC withstands vibrations below 1.0 G and shocks below 25 G.

13.2.7 Acoustical Noise

PBC does not emit any acoustical noise.

13.2.8 Power supply

The PBC can be connected to the nominal mains supply voltages in *Table 77 on page 462*.

The PBC shall be connected to a dedicated circuit in the power distribution board. The circuit must be connected to the same phase as the RBS 2302. The circuit shall be fused with single fuse if the circuit is between phase and neutral, and two fuses if the circuit is between two phases.

Note: All units must be connected to the same phase!

Note: Fuse value must not exceed 10 A.

The power distribution cable shall have two power supply conductors and one protective earth conductor. Conductor size must be selected according to applicable electrical regulations.

Connections are made on terminals in the interface box on the mounting base. The terminals will accept wires having a maximum area of $2.5\ mm^2$.

The mains voltage is connected between two of the terminals. The third terminal is a screw terminal on the body, used for protective earth.

The cable gland has capacity for one power cable with an outer sheath diameter of 7– 15 mm.

Note: A lockable mains switch must be provided close to the base station. It is also recommended that an AC mains outlet is mounted close to the base station, for installation and test equipment.

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Limiting Values for AC Mains Supply

Table 83 Limiting values

Non destructive range	
Permanent	0 V-280 V
Overvoltage < 10 ms	280 V-300 V
Pulses < 50µs	6 kV

Table 84 Power consumption and heat generation

Operation [1)]	**Power consumption (VA)**	**Heat generation (W)**
Normal operation	150	60
Maximum[2)]	200	75

[1)]PBC with fully loaded batteries in configuration with one RBS 2302 and three Mini Link E Micro.

[2)]With activated heater.

Batteries

The battery back-up consists of four 12 V modules. It is foreseen that batteries may be obtained from a local distributor to Hawker Energy. Locally supplied batteries must be of the type XT 13 from Hawker Energy, or compatible. This is a sealed lead acid battery with valve ventilators and intended for stationary use.

To enable DC power backup to RBS 2302, the PBC is supplied with a Power Supply Adapter. The battery adapter is inserted into the battery compartment in RBS 2302 and the cable to the battery adaptor is connected to the interface box in the PBC.

13.2.9 PBC Backup Capacity

The table below states the power consumption of the different parts of Maxite and how much battery power the equipment requires in the PBC when Maxite is in backup mode.

The table is divided into:

- Typical values — values measured by Ericsson in laboratory on a limited number of units.
- Guaranteed values — values guaranteed by the design.

In order to find out:

- the typical time for the Maxite configuration, add the values in the column “Battery Power Consumtion Typical” and check the corresponding value in the graph below.
- how long the Maxite configuration guarenteed will stay in operation, add the values in the column “Battery Power Consumption Guarenteed” and check the corresponding value in the graph below.

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Graph ?? is used for normal temperature (approximately 25 degrees) and graph ?? for cold environments (approximately 33 degrees below zero).

Table 85

Item	Voltage	Power Consumtion Typical[3)]	Power Consumption Guaranteed[3)]	Battery Power Consumption Typical[3)]	Battery Power Consumption Guaramteed[3)]
RBS	+24 V	70 W	150 W	86 W	185 W
PSA Cable Loss[1)]	+24 V	5 W	10 W	6 W	12 W
Mini Link	-48 V	22 W[2)]	25 W	20.5 W[2)]	25 W
Cable Loss	-48 V	0.028 W/m	0.028 W/m	0.026 W/m	0.026 W/m

[1)]For PSA Cable of 5 m.

[2)]According to Mini Link^{TM}E Micro Technical Description Manual

[3)]All values in the table is when full traffic on all TRXs.

13.2.10 Earthing

The mounting base has one earthing point. The earthing point is a M8 bolt. A suitable earthing kit must be used to connect the bolt with the lightning protection system of the site.

13.3 HDSL Modem

13.3.1 General

The HDSL (High-bit rate Digital Subscriber Line) is an optional transmission module, mounted in an extended installation box door. By using the integrated HDSL transmission it is possible to connect the RBS 2302 to physical twisted copper pairs from a BSC (Base Station Controller) with HDSL equipment at BSC site and/or to another RBS 2302 with HDSL. The distance can be longer than with traditional line terminals. The usage of repeaters will then be reduced, which means lower transmission costs. This makes the installation easier and the sites will be more landlord friendly due to integrated solution.

Note: HDSL technology uses duplex communication on each pair.

The wires in a pair are polarity independent. When a two pair HDSL interface is used, the two pairs can be connected arbitrarily.

13.3.2 HDSL Modem Technical Specification

Data Terminal Equipment Interface (to BTS)

Device name: NTU-E–2P

DTE bit rate: 2048 kbit/s

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DTE interface type: G.703, 120Ω balanced, G.704 frame structure

DTE signal coding: HDB3

DTE timing: Co-directional

Line Interface (HDSL)

Line rates: 2320 kbit/s, 1168 kbit/s or 592 kbit/s, automatic rate detection at slave modems

Line code: 2B1Q

Impedance: 135Ω

Transmit level: +13.5 dBm (at 135Ω resistive load)

Max. cable length *See Table 86 on page 474*and *Table 87 on page 475*

Table 86 Maximum cable attenuation and length with 0.4 mm 37 nF/km cable. The cable attenuation is 9.1 dB/km at 150 kHz.

	0.4 mm 37nF/km 9.1 dB/km					
	no noise		**5µV/√(Hz) ie. -6 dB**		**10 µV/√(Hz) ie. 0 dB**	
line rate (kbit/s)	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**
2320	4.0	36	3.0	27	2.4	22
1168	5.2	47	4.2	38	3.6	33
592	5.4	49	4.8	43	4.2	38

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Table 87 Maximum cable attenuation and length with 0.5 mm 40 nF/km cable. The cable attenuation is 6.6 dB/km at 150 kHz.

	0.5 mm 40 nF/km 6.6 dB/km					
	no noise		**5µV/√(Hz) ie. -6 dB**		**10 µV/√(Hz) ie. 0 dB**	
line rate (kbit/s)	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**	**maximum cable length (km)**	**maximum attenuation at 150 kHz (dB)**
2320	5.0	33	3.9	26	3.4	23
1168	7.0	46	5.7	38	5.0	33
592	7.5	50	6.9	46	6.0	40

Note: 10µV/√(Hz) is the noise level according to the ETSI Technical Specifications TS 101 135. 5µV/√(Hz) is a 6 dB lower noise level.

For planning the HDSL transmission network following should be considered:

By using the attenuation values in the 10µV/√(Hz) noise level column, an undisturbed and reliable operation can be obtained on most connections. The attenuation values in the "no noise" column shall be considered as theoretical values.

Power

Input voltage: +7 V DC (supply from the radio cabinet)

Power consumption: max 3.5 W at NTU-E-2P

Dimension and Weight

The size of the door including HDSL modem:

(H x W x D): 488 x 112 x 44 mm

The total weight of the door including HDSL modem is 1.7 kg.

13.3.3 Material

The HDSL Modem Module consists of one kit, product number ZAT 759 19/101.

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14 Glossary

This glossary lists abbreviations and acronyms used in texts dealing with RBS 2301 and 2302. Some basic terms and acronyms needed for cross-references are included in the list.

In the RBS manuals, terminology defined by GSM is used together with terms related to Ericsson and the CME 20 and CMS 40 projects.

Terms and Abbreviations

An arrow -> is used to indicate a reference to another entry in this list.

1–P	One Pair connection with echo cancellation (= 2 wires)
2–P	Two Pair connection with echo cancellation (= 4 wires)
AAU	Active Antenna Unit
Abis	GSM interface standard defining attributes of the communication between BSC and BTS
AC	Alternating Current
A/D converter	Analog to Digital converter
AGW	Abis Gateway
AIS	Alarm Indication Signal
ALBO	Automatic Line Build Out
ALPU	Antenna Lightning Protection Unit
AO	Application Object
ARAE	Antenna Related Auxiliary Equipment
ARFCN	Absolute Radio Frequency Channel Number
ARP	Antenna Reference Point
ASIC	Application Specific Integrated Circuit
Astra	ASIC in the TRU
AU	Antenna Unit GSM 900 = CEU + Passive Antenna GSM 1800/1900 = AAU
BCCH	Broadcast Control CHannel

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	Downlink only broadcast channel for broadcast of general information at a base station, on a base station basis.
BCS	Block Check Sequence
BER	Bit Error Rate
BSC	Base Station Controller GSM network node for control of one or more BTSs.
BSCSim	Base Station Controller Simulator
BSS	Base Station System GSM network logical unit comprising one BSC and one or more BTSs.
BTS	Base Transceiver Station GSM network unit operating on a set of radio frequency channels in one cell.
Burst	A portion of digital information, the physical content, that is transferred within the time interval of one time slot.
Cabinet	The physical housing of a base station
CAN	Canada
Cascade connections	Connection of several cabinets by the PCM cable. Similar to serial connection. -> Cascading
Cascading	Connection of several cabinets by the PCM cable. Similar to serial connection. -> Cascade connections
CCCH	Common Control CHannel Channel combining the following common control channels: PCH Paging CHannel RACH Random Access CHannel AGCH Access Grant CHannel
CDU	Combining and Distribution Unit
Cell	An area of radio coverage identified by the GSM network by means of the cell identity.

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CEU	Coverage Extension Unit
CF	Central Functions
Channel	The common term channel denotes the virtual connection, consisting of physical and logical channels between BSS and MS, during a call in progress. -> Logical Channel -> Physical Channel
Channel Combination	A physical channel on an air interface carries a defined set of logical channels.
Channel group	A channel group is a group of dedicated logical channels to a specific MS.
CM	Common Mode
CME 20	Cellular Mobile Europe - CME 20 Ericsson digital land mobile telecommunication system based on the GSM standards. - CME 201 Ericsson GSM system comprising Ericsson equipment only.
CMRU	Central Main Replaceable Unit. Main RU. The RBS is physically connected to the Base Station Controller (BSC) via the CMRU. There is only one CMRU in each RBS.
CMS 40	Cellular Mobile System Ericsson digital land mobile telecommunication system based on the Joint Technical Committee (JTC) specification for PCS 1900.
CPI	Communication and Power Interface
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
CS	Coding Scheme
CSA	Canadian Standards Association
CSES	Consecutive Severely Errored Second
CSU	Customer Service Unit
Dannie	ASIC in the TRU
dB	decibel

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dBm	Decibel per 1 milliwatt
DB	DataBase
DC	Direct Current
DCC	Digital Cross Connector
DIP	DIgital Path The name of the function used for supervision of the connected PCM lines.
Dixie	ASIC in the TRU
DM	Degraded Minute
DM	Differential Mode
DMRU	Distributed Main Replaceable Unit If a Main RU is subordinated to the CMRU, it is said to be distributed.
Downlink	Signalling direction, from the system to the MS
DP	Distribution Panel
DPX	Duplexer
DS1	Digital Signal Level 1 (1544 kbit/s)
DSP	Digital Signal Processor
DTE	Data Terminal Equipment
DTF	Distance To Fault
DUT	Device Under Test
DXB	Distribution Switch Board
DXX	Ericsson Cellular Transmission System including NMS
E1	Short for G.703 2048 kbit/s PCM link
EEPROM	Electrically Erasable Programmable Read-Only Memory
EIRP	Effective Isotropic Radiated Power
EMC	Electro Magnetic Compatibility
EOC	Embedded Operations Channel
ES	Errored Second

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ESB	External Synchronization Bus
ESD	ElectroStatic Discharge
ETS	European Telecommunication Standard
EXT	External
FCC	Federal Communications Commission
FDL	Facility Data Link
FDU	Feeder Duplexer Unit
FS	Function Specification
FSC	Field Support Centre
FU	Filter Unit
GPRS	General Packet Radio Services
GS	General Specification
GSL	GPRS Signalling Link
GSM	Global System for Mobile communications International standard for a TDMA digital mobile communication system. Originally, GSM was an abbreviation for Groupe Special Mobile, which is a European mobile telecommunication interest group, established in 1982.
GSM 900	GSM system 900 MHz (generic)
GSM 1800	(GSM-based) Digital Communication System 1800 MHz (generic)
GSM 1900	(GSM-based) Digital Communication System 1900 MHz (generic)
HCE	HDSL Central Equipment
HDLC	High level Data Link Control
HDSL	High bit rate Digital Subscriber Line
HISC	HIghway Splitter Combiner
HLIN	High Level IN
HLOUT	High Level OUT
HW	HardWare
HWU	HardWare Unit

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	An HWU consists of one or more SEs. An HWU is a functional unit within the RBS. The HWU is either active (equipped with a processor) or passive (without processor).
IA	Immediate Assignment
ID	IDentification
IDB	Installation Data Base
IEC	International Electric Commission
IF box	Inter Face Box
INT	Internal
IS	Interface Switch
I1A	Internal Fault Map Class 1A
I1B	Internal Fault Map Class 1B
I2A	Internal Fault Map Class 2A
JTC	Joint Technical Committee
LAN	Local Area Network
LAPD	Link Access Procedures on D-channel LAPD is the data link layer (layer 2) protocol used for communication between the BSC and the BTS on the Abis interface. Abis layer 2 is sometimes used synonymously with LAPD.
LBO	Line Build Out
LED	Light Emitting Diode
LLB	Line Loop Back
LNA	Low Noise Amplifier
Local bus	The local bus offers communication between a central main RU (DXU) and distributed main RUs (TRU and ECU).
Local mode	When the RU is in RU mode Local it is not prepared for BSC communication.
Local/Remote switch	Using the Local/Remote switch, an operator orders the RU to enter Local or Remote mode.
LOF	Loss Of Frame

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Logical Channel	A logical channel represents a specified portion of the informationcarrying capacity of a physical channel. GSM defines two major categories of logical channels: TCHs Traffic CHannels, for speech or user data CCHs Control CHannels, for control signalling. -> Physical Channel -> Channel Combination
Logical RU	A unit which can be referred to, but is not a single physical unit. There are three different kinds of logical RUs: 1. Buses 2. Antennas 3. Environment
LOS	Loss Of Signal
LVD	Low Voltage Directive
LVF	Low Voltage Filter
MAC	Medium Access Controller
MADT	Mean Accumulated DownTime
Main RU	A main replaceable unit is a replaceable unit that contains one or more processors, to which software can be downloaded from the BSC.
MCB	MultiCasting Box
MHS	Modification Handling System Ericsson trouble report database
MMI	Man-Machine Interface
MO	Managed Object
MRT	Mean Repair Time
MS	Mobile Station
MTBF	Mean Time Between Failure
MTBCF	Mean Time Between Catastrophe Failure
NCS	National Colour System

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NMS	Ericsson Network Management System in DXX
Nominal Power	The nominal power is the power level defined when configuring the transceiver.
NTU	Network Terminating Unit
O&M	Operation and Maintenance General term for activities such as configuration, utilization of channels (frequency bands), cell planning, system supervision, hardware and software maintenance, subscriber administration, and so forth
OMC	Operation and Maintenance Centre
OMT	Operation and Maintenance Terminal The OMT is a terminal that supports functions for handling the RBS on site. The terminal can be a portable PC.
Operation	Operation is the normal, everyday running of the RBS with full functionality.
OPI	OPerational Instructions
PA	Power Amplifier
PAM	Power Amplifier Module
PBA	Printed Board Assembly
PBC	Power and Battery Cabinet
PC	Personal Computer
PCB	Printed Circuit Board
PCH	Paging CHannel Downlink only subchannel of CCCH for system paging of MSs. -> CCCH
PCM	Pulse Coded Modulations (used as a name for the G.703 transmission interface)
PCU	Packet Control Unit
PDCH	Packet Data Channel
PFWD	Power Forward

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Physical Channel	An air interface physical channel carries one or more logical channels. A physical channel uses a combination of frequency and time division multiplexing and is defined as a sequence of radio frequency channels and time slots. -> TDMA frame -> Logical channel
PIN	Personal Identification Number
PLB	Payload Loop Back
PREFL	Power Reflected
PSA	Power Supply Adapter
PSU	Power Supply Unit
RACH	Random Access CHannel Uplink only subchannel of CCCH for MS request for allocation of a dedicated channel. -> CCCH
RAI	Remote Alarm Indication
RAM	Random Access Memory
RBS	Radio Base Station All equipment forming one or more Ericsson base stations. ->BTS
RBS 2000	New RBS generation
Remote mode	When the RU is in RU mode Remote, a link is established between the BCS and the central main RU.
RF	Radio Frequency
RLC	Radio Link Control
RLC	Repair Logistic Centre
RSL	Radio Signalling Link
R-state	Release state
RTN	Return
RU	Replaceable Unit An RU consists of one or more HWUs. An RU may be replaced by another RU of

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	the same type. The RU is the smallest unit that can be handled on site.
RX	Receiver
RXA	Receiver Antenna branch A
RXB	Receiver Antenna branch B
RXDA	Receiver Divider Amplifier
RXDP	Receiver Distribution Plane
RXQUAL	Measure of signal quality as defined in GSM 05.08:8.2.4
SES	Severely Errored Second
SIR	Small Indoor RBS
SO	Service Object
Sub RU	A sub-replaceable unit is always connected to a superior Main RU. This connection is used for example for retrieval of the RU identity. A sub-RU normally does not have a processor. Note that an RU with a processor that is not loadable is classified as a sub-RU.
SW	SoftWare
SWR	Standing Wave Ratio
SYNC	Synchronous
T1	Transmission facility for DS1 (1544 kbit/s).
TC	Transaction Capabilities
TCB	Tranceiver Control Board
TCH	Traffic CHannel The traffic channels carry either encoded speech or user data.
TDMA	Time Division Multiple Access Multiplexing of several channels in a common frequency band. Each channel is assigned a certain time division, a time slot.
TDMA frame	GSM air interface time frame comprising eight time slots.
TEI	Terminal Endpoint Identifier

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	TEI is an identification code carried by a LAPD frame as a terminal connection endpoint within a Service Access Point (SAP).
TEMS	TEst Mobile Station
TF	Timing Function
TG	Transceiver Group
Timing bus	The timing bus carries air timing information from the timing unit in the DXU to the TRUs.
TLS	Terrestrial Link Supervision
TM	Transport Module
TN O&M	Transport Network Operation and Maintenance (in general).
Tora	ASIC in the TRU
TRA	Transcoder Rate Adapter
	The TRA Unit in BSC performs transcoding of speech information and rate adaption of data information.
Tracy	ASIC in the TRU
TRS	Transceiver System
TRX	Transceiver (combined transmitter and receiver)
TS	Time Slot
	A 0.577 ms period (TDMA frame subunit) corresponding to 156.25 raw bits of information. The eight time slots of each TDMA frame are numbered 0...7.
	-> Burst
TT	Total Time
TX	Transmitter
TXA	Transmitter Antenna branch A
TXB	Transmitter Antenna branch B
TXU	Radio Transmitter Unit
UAS	Unavailable Seconds
UL	Underwriters Laboratories

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Uplink	Signalling direction, from the MS to the system.
UPS	Uninterrupted Power Supply
VCO	Voltage Controlled Oscillator
VSWR	Voltage Standing Wave Ratio RF signal measure. The quotient between transmitted and reflected power.
X-bus	The X-bus carries transmit air data frames between trancievers.

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Ericsson GSM System

RBS 2302
Spare Parts Catalogue

ERICSSON

LZN 302 97 R3C

RBS 2302 Spare Parts Catalogue

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Contents

1 Preface for the Spare Parts Catalogue 5

1.1 Release History 6

2 Spare Parts Philosophy for RBS 2302 7

2.1 General Information 8

3 Recommended Spare Parts for Customer Stock (Repairable) 9

3.1 Radio Cabinet RBS 2302 11

3.2 Power and Battery Cabinet, PBC 13

3.3 Optional HDSL Unit for RBS 2302 15

4 Recommended Spare Parts for Customer Stock (Not Repairable) 17

4.1 Antennas and Front Sunshields for RBS 2302 19

4.2 Other Sunshields and Accessories for RBS 2302 21

4.3 Internal Battery and Power Supply Adapter for RBS 2302 23

4.4 Optional Fan Unit for RBS 2302 25

4.5 Replaceable Boards for RBS 2302 27

4.6 Fuses, Screws and Installation Details for RBS 2302 29

4.7 Sunshields for PBC 31

4.8 Batteries for PBC 33

4.9 Replaceable Boards for PBC 35

4.10 Fuses, Screws and Installation Details for PBC 37

5 Other Available Parts 39

5.1 Battery Accessories for RBS 2302 41

5.2 Other Available Parts for RBS 2302, Mechanics 43

5.3 Other Available Parts for RBS 2302, Cables 45

5.4 Battery Accessories for PBC 47

5.5 Other Available Parts for PBC, Mechanics 49

5.6 Other Available Parts for PBC, Internal Cables 51

5.7 Packages for Repairable Products 53

6 RBS 2302 Product Revision Information 55

6.1 Replaced or Withdrawn Products 56

7 Numerical index for RBS 2302 57

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1 Preface for the Spare Parts Catalogue

The purpose of this Catalogue is to provide information necessary to order replaceable parts. (This information is useful for the general planning of a maintenance organisation and in building up a spare parts stock.)

The Spare Parts Catalogue can be ordered separately, but is also included in the User's Guide. See tables below.

This catalogue describes the RBS 2302 and options.

Customer Library RBS 2302	**LZN 302 71**
Library Overview	LZN 302 73
RBS 2302 User's Guide	LZN 302 74
Reference Manual	LZN 302 77
General Installation Instructions	LZN 302 49
Spare Parts Catalogue RBS 2302	LZN 302 97

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1.1 Release History

In addition to editorial changes, such as corrections of spelling, grammar and layout, the following changes have been made for each release.

Only the three latest revisions are listed below.

1.1.1 R1A to R2A

- GSM 1900 Radio Unit variants.
- Optional cables for 4 and 6 TRX.

1.1.2 R2A to R3A

- Optional external Fan Unit for RBS 2302.
- Optional HDSL modem for RBS 2302.

1.1.3 R3A to R3B

- New productnumbers for RBS 2302 manuals.

1.1.4 R3B to R3C

- Subsection *Packages for Repairable Products* added to section *Other Available Parts*.
- Note Available from Q1 99 removed throughout.
- Multicasting Box (filter unit) changed to Filter Unit (Multicasting Box)
- EMC board changed to EMC–In Board.

  DC alarm board changed to DC Surge Board.

  AC board changed to AC Surge Board.
- See *Section 6.1 on page 56*.

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2 Spare Parts Philosophy for RBS 2302

Specification and classification of spare parts is done during the service preparation process which is a part of the desing process. The result is a spare part list containing three classes of spare parts:

1. Recommended for customer stock. Intended to be replaced on site and intended to be repaired at an Ericsson Repair Center (former code = U).
2. Recommended for customer stock. Intended to be replaced on site or at local shop and intended to be disposed after use (former code = R).
3. Not recommended for customer stock. The parts are available when needed (former code = A).

The spare parts catalogue is adapted to this structure.

The dimensioning and recommendation of spare parts will not follow the principle one-of-each-board-in-use unless the customer expressly requests it..

The dimensioning and recommendation of spare part stocks is and will be done with a computer-based calculation model for BTS equipment.

The tool works with the following parameters:

- Product reliability (MTBF)
- Spare part delivery lead time or repair turn around time.
- Chosen service level, that is, Spare Parts Management.
- The spare part structure.
- Quantity of each unit in operation to be supported by the specific stock.
- The probability of shortage.

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2.1 General Information

The catalogue is divided into separate chapters, depending on recommendations (classifications).

Position numbers put in brackets ( ) are associated parts, not necessarily shown in illustrations. Position numbers with letters, for example 3A, 3B are alternative products.

Parts without a Product number may be shown on illustrations, but are not recommended for customer stock, or may be included in a Spare Parts Set (and cannot be ordered separately). If a reference to another chapter is given, more information will be found there.

Spare Parts Ordering Address:

Please use the Regional Ericsson Company, or contact:

Ericsson Radio Systems AB

Customer Services

S-164 80 Stockholm

Repair Delivery Address:

Please use the Regional Logistics Centre specified in the System Services Contract with the local Ericsson Radio Systems Company.

Catalogue Ordering:

How to order CPI:.

Outside Ericsson:

The CPI can be ordered in the same way as any other Ericsson product. Contact an Ericsson company to place the order.

The CPI is accessible on Extranet at this address:

https://al.cpi.ericsson.net/

A user identity and a password is required for accessing the Extranet from this page. More detailed information can be found at the same address.

Inside Ericsson:

All manuals are available on the Intranet at the CPI Store:

http://cpistore.ericsson.se

Remarks

External users' comments or questions regarding information in this catalogue should be addressed to :Spare Parts Documentation Telefax: **+46 8 757 1388** or as e-mail to **erac.eraspare@mesmtpse.ericsson.se**

Internal Ericsson users can e-mail as above or make an MHS Trouble Report on the catalogue's Product No. and R-state.

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3 Recommended Spare Parts for Customer Stock (Repairable)

About this Chapter

All spare parts in this chapter have the internal code = U.

These parts are recommended for customer stock. They are intended to be replaced on site and repaired at an Ericsson Repair Centre.

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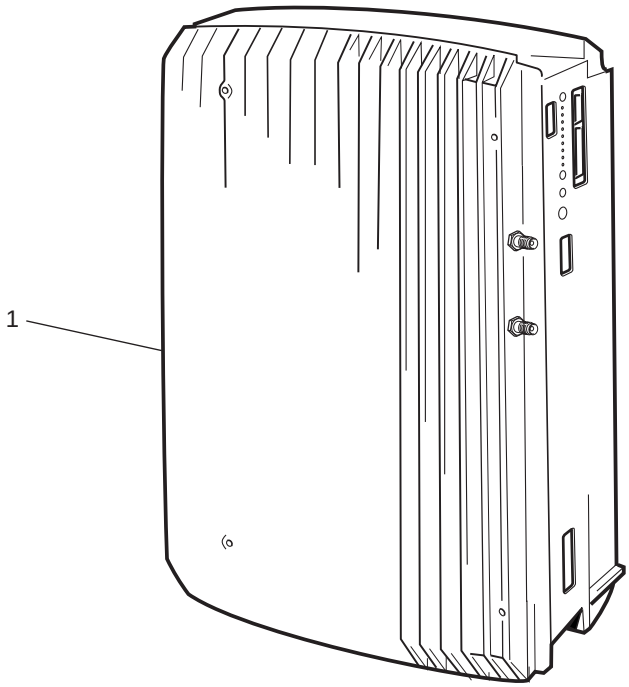

Figure 1

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3.1 Radio Cabinet RBS 2302

3.1.1 GSM 900

Pos	Product No.	Product Name	System standard	Number of TRXs	Transm. Interface	Intern. Synch	Encr	Filter Type
1	KRC 161 31/022	Radio unit	GSM 900	2	E1	N	A5/1	DPX
	KRC 161 31/024	Radio unit	GSM 900	2	E1	N	A5/2	DPX
	KRC 161 31/032	Radio unit	GSM 900	2	T1	N	A5/2	DPX

3.1.2 GSM 1800

KRC 161 31/054	Radio unit	GSM 1800	2	E1	N	A5/1	DPX
KRC 161 31/056	Radio unit	GSM 1800	2	E1	N	A5/2	DPX
KRC 161 31/064	Radio unit	GSM 1800	2	T1	N	A5/2	DPX

3.1.3 GSM 1900

KRC 161 31/088	Radio unit	GSM 1900	2	E1	N	A5/2	DPX
KRC 161 31/090	Radio unit	GSM 1900	2	T1	Y	A5/1	DPX
KRC 161 31/094	Radio unit	GSM 1900	2	T1	N	A5/1	DPX

Note: The Radio unit does not include Mounting Base and Battery.

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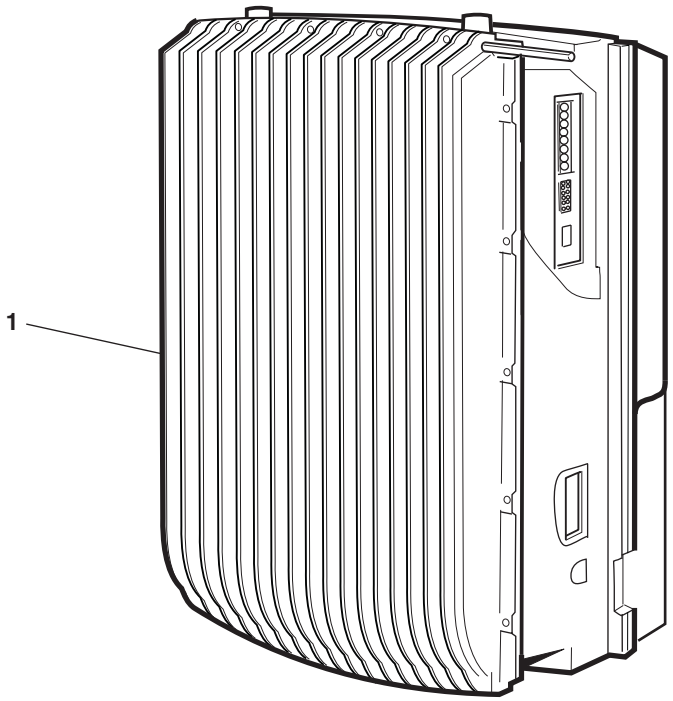

Figure 2

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3.2 Power and Battery Cabinet, PBC

Pos.	Product No.	Product Name	Description
1	BMK 905 01/1	Battery Cabinet	*(Not including Mounting Base and Battery)*

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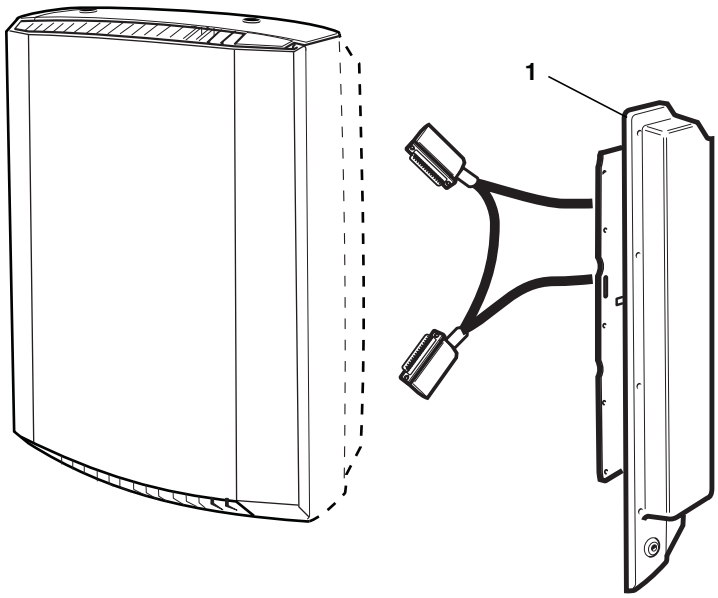

Figure 3

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3.3 Optional HDSL Unit for RBS 2302

3.3.1 HDSL Unit

Pos.	Product No.	Product Name	Description
1	ZAT 759 19/101	Modem	Complete side door for RBS 2302. Including HDSL modem and internal cables.

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4 Recommended Spare Parts for Customer Stock (Not Repairable)

About this Chapter

All spare parts in this chapter have the internal code = R.

These parts are recommended for Customer stock. They are intended to be replaced on site and disposed of after use.

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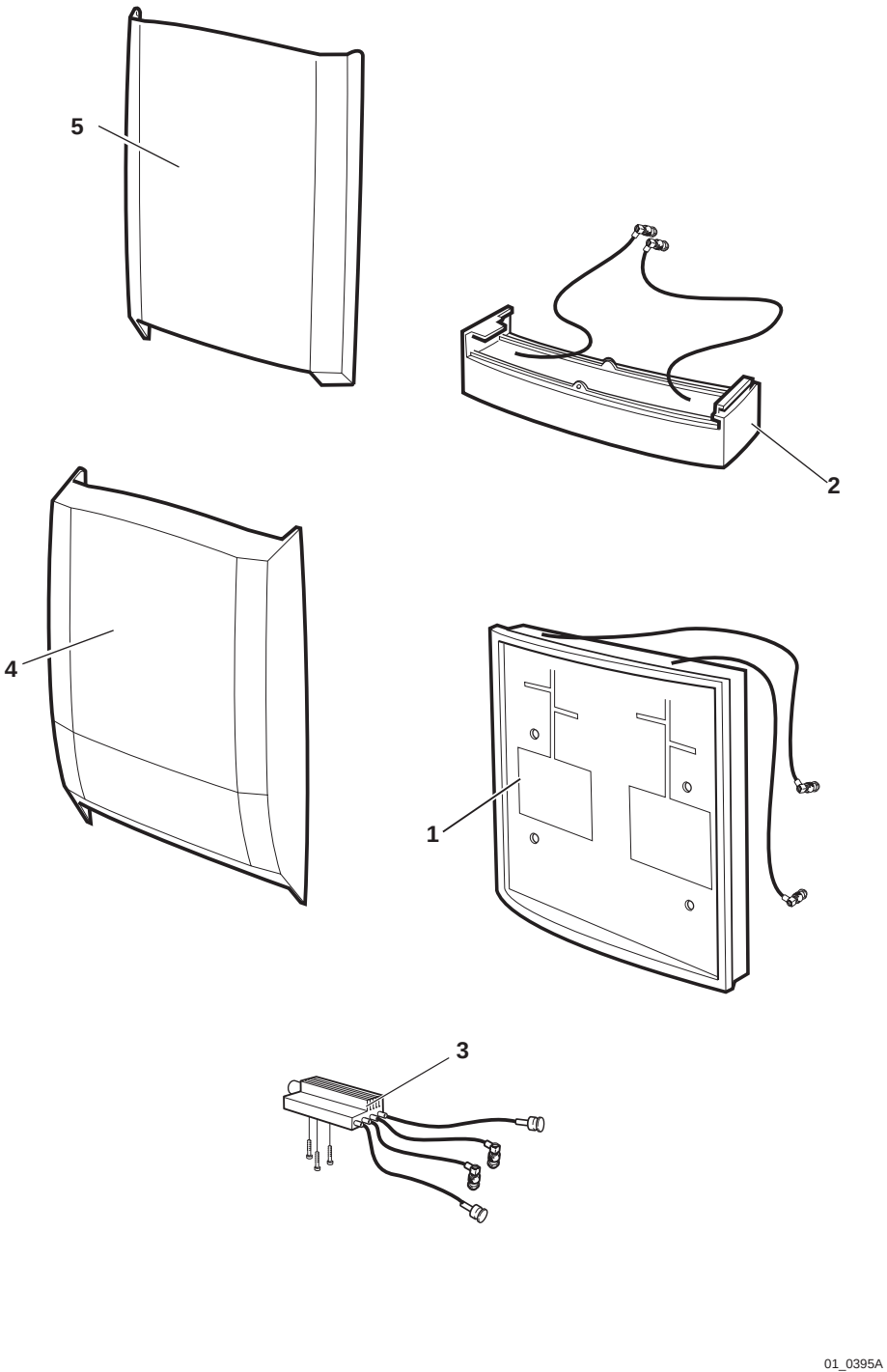

Figure 4

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4.1 Antennas and Front Sunshields for RBS 2302

4.1.1 Antennas

Pos.	Product No.	Product Name	Description
1	KRE 101 1556	Antenna unit	Sector antenna, GSM 900 /*Incl cables*
	KRE 101 1557	Antenna unit	Sector antenna, GSM 1800 /*Incl cables*
	KRE 101 1558	Antenna unit	Sector antenna, GSM 1900 /*Incl cables*
2	KRE 101 1559	Antenna unit	Omni directional antenna, GSM 900 /*Incl cables*
	KRE 101 1560	Antenna unit	Omni directional antenna, GSM 1800 /*Incl cables*
	KRE 101 1561	Antenna unit	Omni directional antenna, GSM 1900 /*Incl cables*
3	KRF 201 439/1	Filter Unit (Multicasting Box)	/*Incl cables*

4.1.2 Sunshields

4.1.2.1 Front Sun Shields for Sector Antenna

4	SDF 105 10/1	Sun Shield	Front radom /*Grey*
	SDF 105 10/2	Sun Shield	Front radom /*Green*
	SDF 105 10/3	Sun Shield	Front radom /*Blue*
	SDF 105 10/4	Sun Shield	Front radom /*Red*
	SDF 105 10/5	Sun Shield	Front radom /*Ochre*
	SDF 105 10/6	Sun Shield	Front radom /*Yellow*

4.1.2.2 Front Sun Shields for Omni Directional Antenna (and External Antennas)

5	SDF 105 09/1	Sun Shield	Front /*Grey*
	SDF 105 09/2	Sun Shield	Front /*Green*
	SDF 105 09/3	Sun Shield	Front /*Blue*
	SDF 105 09/4	Sun Shield	Front /*Red*
	SDF 105 09/5	Sun Shield	Front /*Ochre*
	SDF 105 09/6	Sun Shield	Front /*Yellow*

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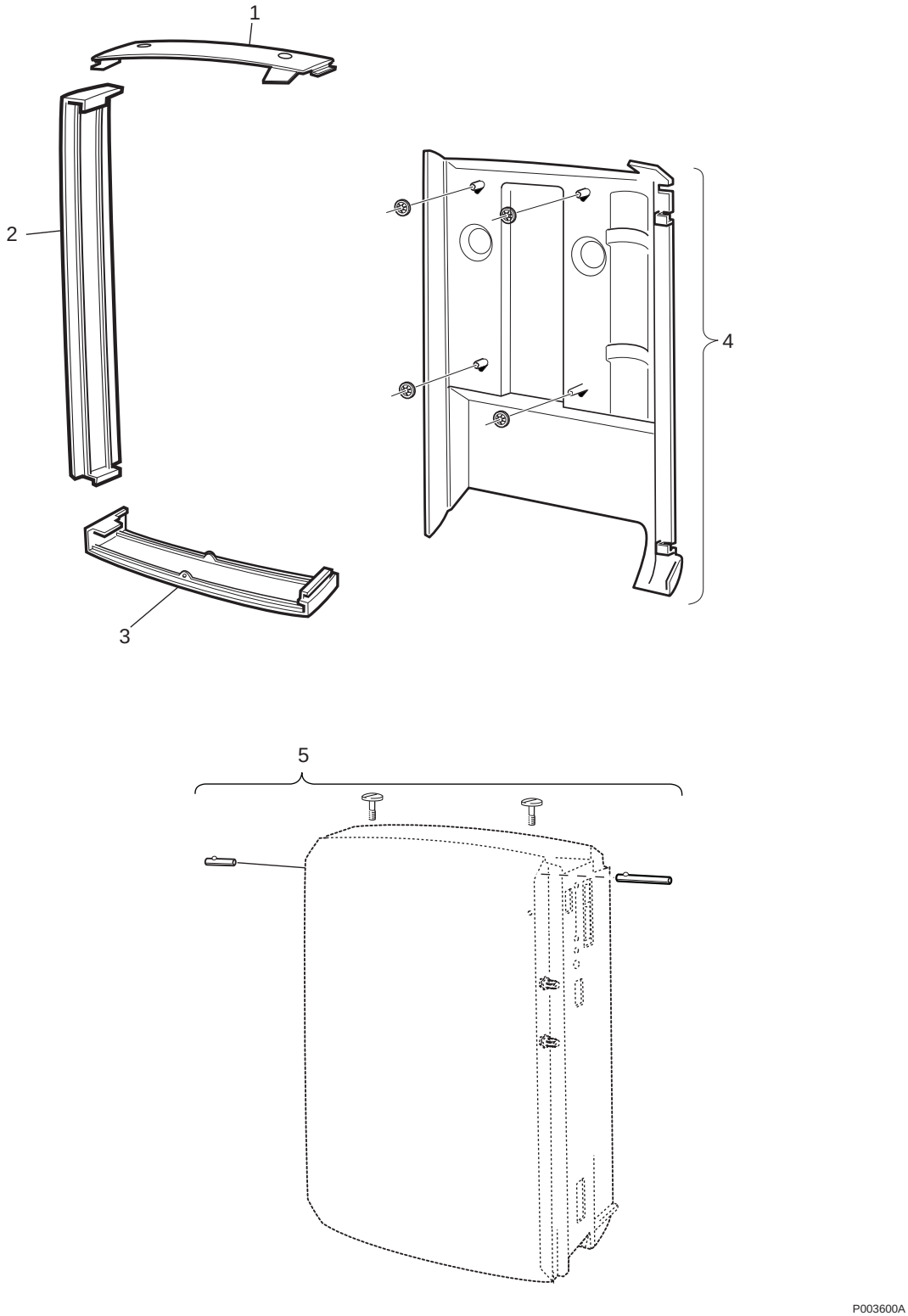

Figure 5

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4.2 Other Sunshields and Accessories for RBS 2302

Pos.	Product No.	Product Name	Description
1	SDF 105 11/1	Sun Shield	Upper/*Grey*
2	SDF 105 12/1	Sun Shield	Left /*Grey*
3	SDF 105 13/1	Sun Shield	Lower/*Grey*
4	NTZ 111 44/01	Spare Parts Set	Rear Sunshield, /*Grey. Includes Locking Washers. (Also included in a Mounting Base)*
5	NTZ 112 86/SH03	Spare Parts Set	Sun Shield Accessories/*Includes front right and left shaft (hinge pin) and upper end plugs.*

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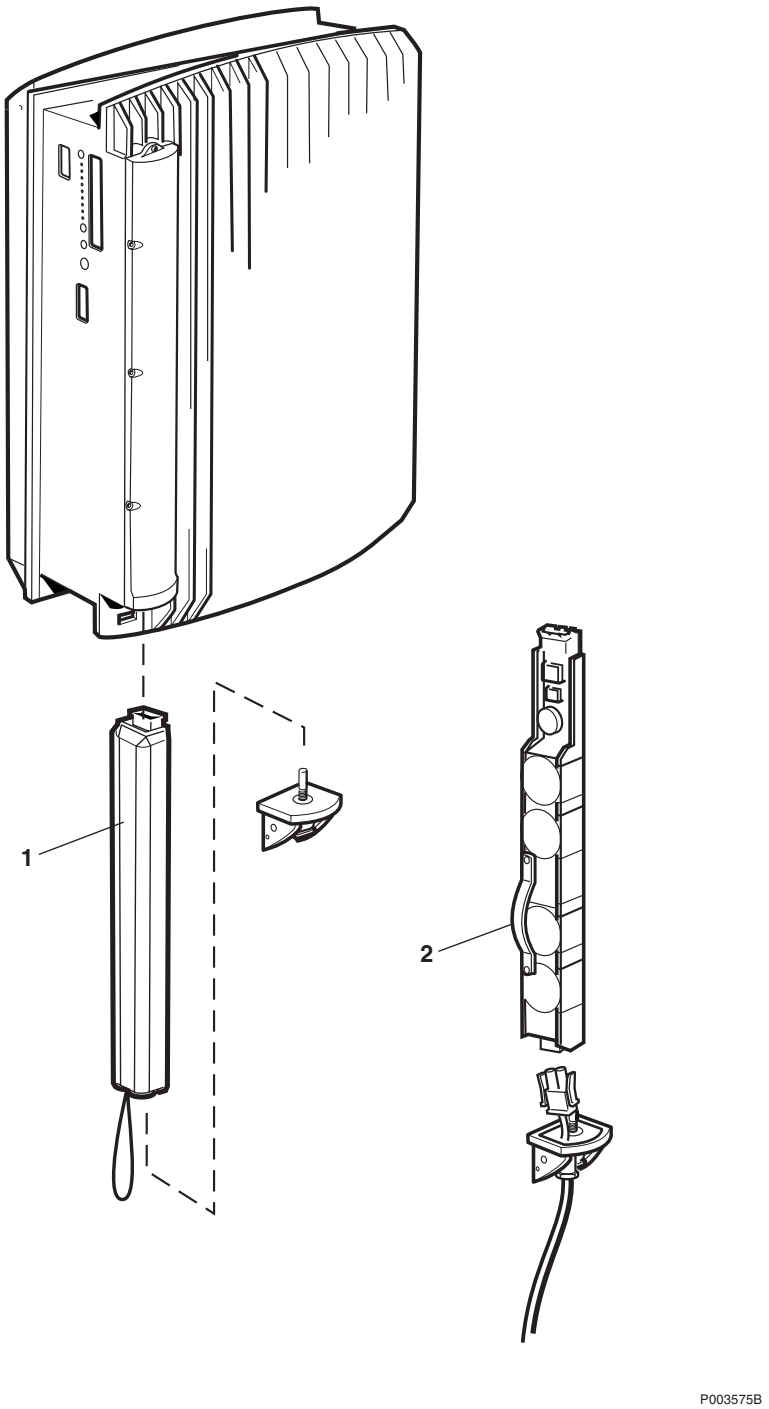

Figure 6

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4.3 Internal Battery and Power Supply Adapter for RBS 2302

Pos.	Product No.	Product Name	Description
1	BKB 191 2022/1	Battery Unit	Not used if PBC attached see below.
2	BMY 908 04/1	Adapter	PSA, power supply adapter kit /*Includes cover lid, cable 5.0 m and other details. To be used in RBS 2302 instead of internal battery, when PBC attached.*

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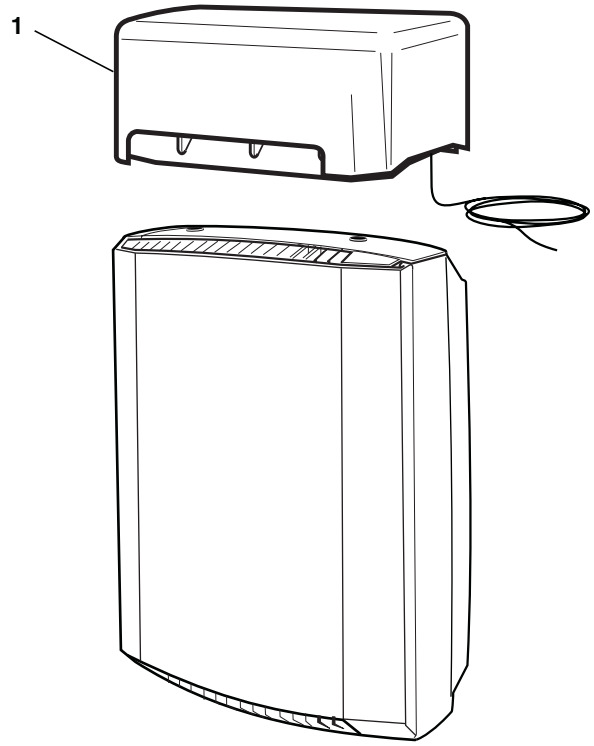

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Figure 7

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4.4 Optional Fan Unit for RBS 2302

4.4.1 Fan Unit

Pos.	Product No.	Product Name	Description
1	BKV 301 321/1	Fan Unit	Complete Unit to be mounted on top of RBS 2302. Including alarm cable. Not including power cable.

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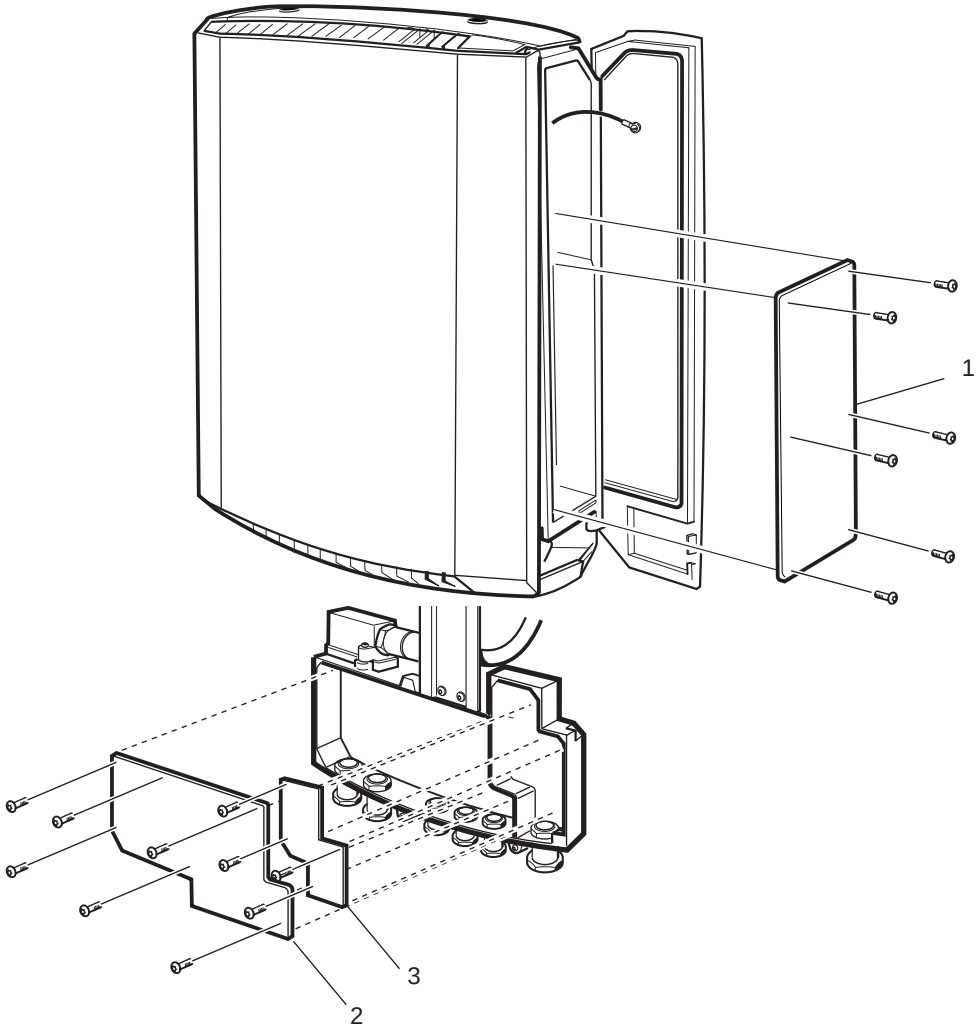

Figure 8

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4.5 Replaceable Boards for RBS 2302

Pos.	Product No.	Product Name	Description
1	NTZ 111 44/02	Spare Parts Set	Connection board /*Incl screws.*
2	NTZ 111 44/03	Spare Parts Set	Transmission board /*Incl screws.*
3	NTZ 111 44/04	Spare Parts Set	AC board /*Incl screws.*

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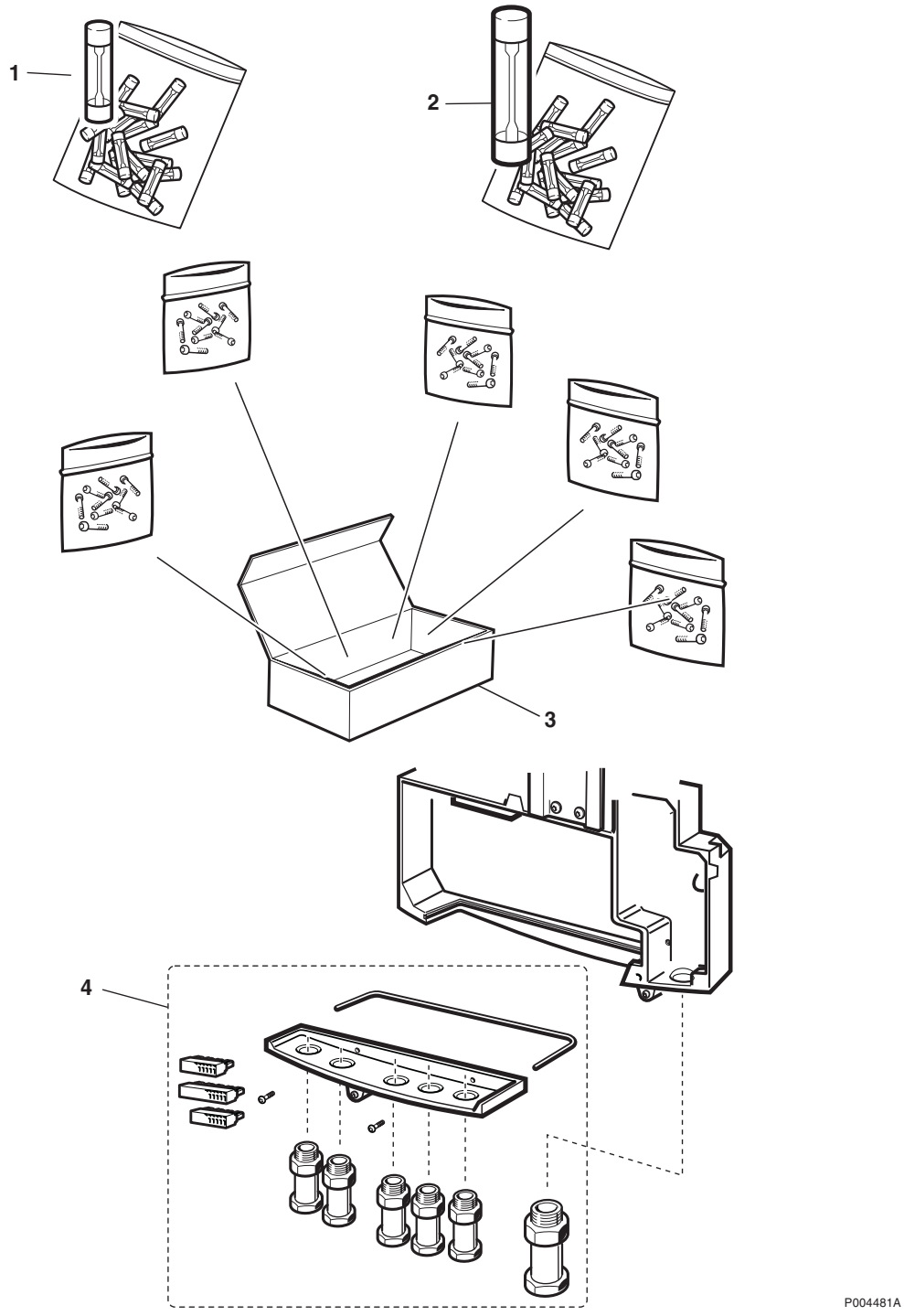

Figure 9

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4.6 Fuses, Screws and Installation Details for RBS 2302

Pos.	Product No.	Product Name	Description
1	NTZ 111 44/08	Spare Parts Set	Fuses for 230 V /*6.3A size 5x20 mm, slow blow, 20 pcs.*
2	NTZ 112 86/FU02	Spare Parts Set	Fuses for 115 V /*8A size 6.3 x32 mm, slow blow, 20 pcs*
3	NTZ 111 44/05	Spare Parts Set	Set of screws for RBS 2302 /*Includes some of the most common screws, washers and fixing details.*
4	NTZ 111 44/06	Spare Parts Set	Set for RBS 2302 Interface box /*Includes terminal blocks, cable glands and O-rings, gland plate with screws and shielding gasket.*

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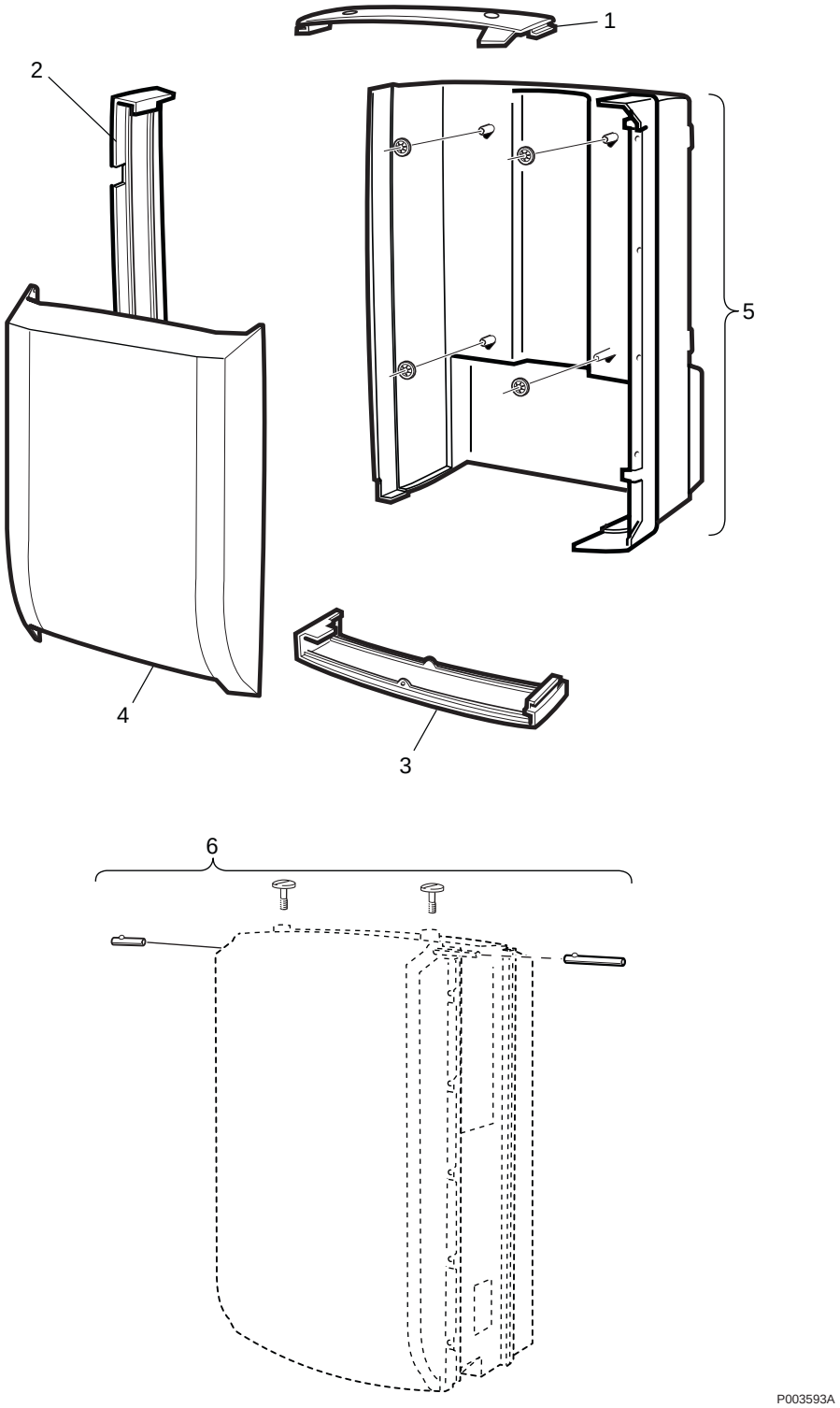

Figure 10

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4.7 Sunshields for PBC

Pos	Product No	Product name	Description
1	SDF 105 11/1	Sun Shield	Upper /*Grey*
2	SDF 105 12/2	Sun Shield	Left /*Grey*
3	SDF 105 13/1	Sun Shield	Lower /*Grey*
4	SDF 105 10/21	Sun Shield	Front /*Grey*
	SDF 105 10/22	Sun Shield	Front /*Green*
	SDF 105 10/23	Sun Shield	Front /*Blue*
	SDF 105 10/24	Sun Shield	Front /*Red*
	SDF 105 10/25	Sun Shield	Front /*Ochre*
	SDF 105 10/26	Sun Shield	Front /*Yellow*
5	NTZ 111 45/02	Spare Parts Set	Rear Sunshield /*Grey. Includes Locking Washers. (Also included in a complete Mounting Base)*
6	NTZ 112 86/SH03	Spare Parts Set	Sun Shield Accessories /*Includes front right and left shaft (hinge pin) and upper end plugs.*

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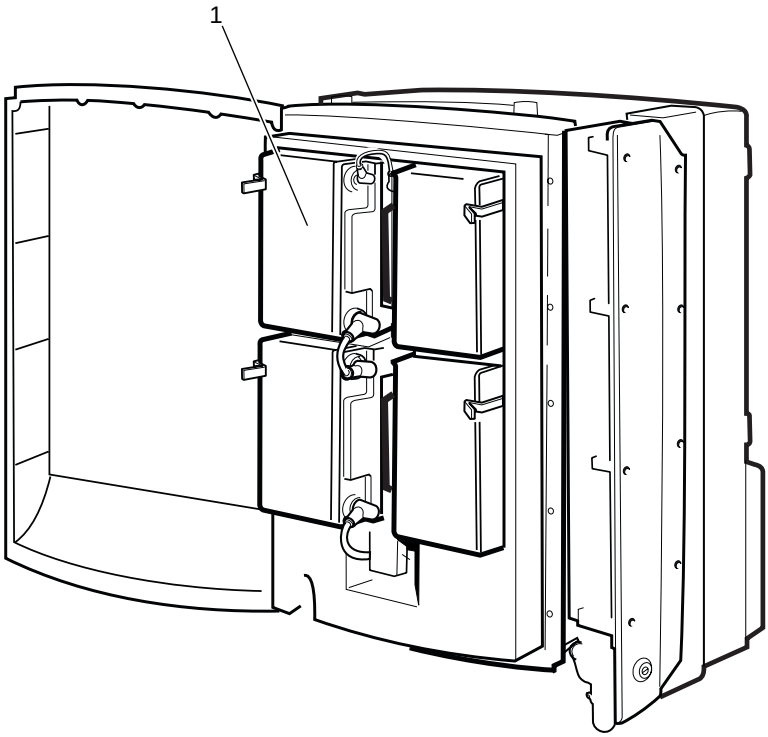

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Figure 11

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4.8 Batteries for PBC

Pos.	Product No.	Product Name	Description
1		Batteries	See **Note**

Note : Local purchase recommended. Batteries must comply with the specification document 1301-BKC 861 available from the local Ericsson Company.
(If local purchase not possible use Product No: 24/BKC 861 0013/004 . Includes 4 batteries)

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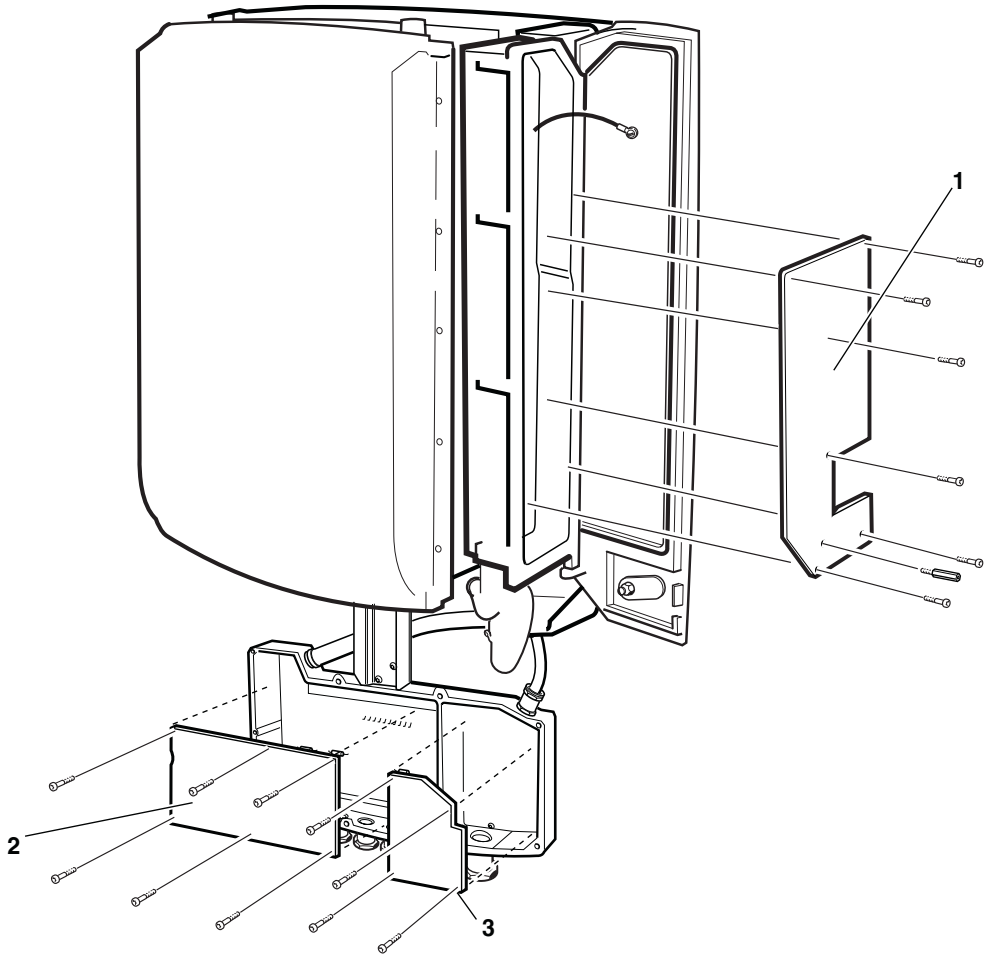

Figure 12

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4.9 Replaceable Boards for PBC

Pos.	Product No.	Product Name	Description
1	NTZ 111 45/03	Spare Parts Set	EMC–In Board /*Incl screws and spacer.*
2	NTZ 111 45/04	Spare Parts Set	DC Surge Board /*Incl screws.*
3	NTZ 111 45/05	Spare Parts Set	AC Surge Board /*Incl screws.*

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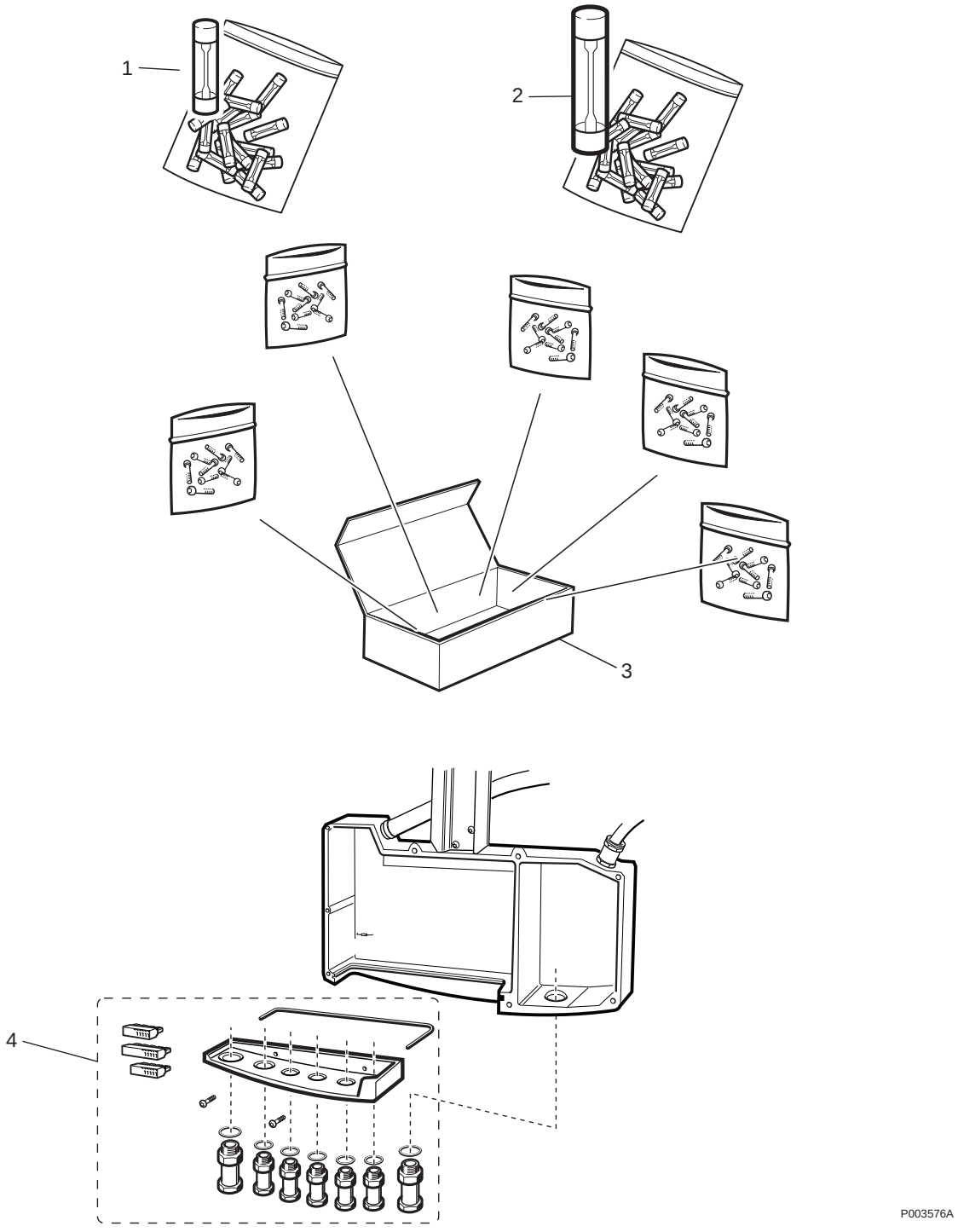

Figure 13

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4.10 Fuses, Screws and Installation Details for PBC

Pos.	Product No.	Product Name	Description
1	NTZ 112 86/FU01	Spare Parts Set	Fuses for 230 V /*4A size 5x20 mm, slow blow, 20 pcs*
2	NTZ 112 86/FU02	Spare Parts Set	Fuses for 115 V /*8A size 6.3 x32 mm, slow blow, 20 pcs*
3	NTZ 111 45/06	Spare Parts Set	Set of screws for PBC/*Includes some of the most common screws, washers and fixing details.*
4	NTZ 111 45/01	Spare Parts Set	Set for PBC Interface box /*Includes terminal blocks, cable glands and O-rings, gland plate with screws and shielding gasket.*

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5 Other Available Parts

About this Chapter

All spare parts in this chapter have the internal code = A.

These parts are not recommended for Customer stock. The parts are available when needed.

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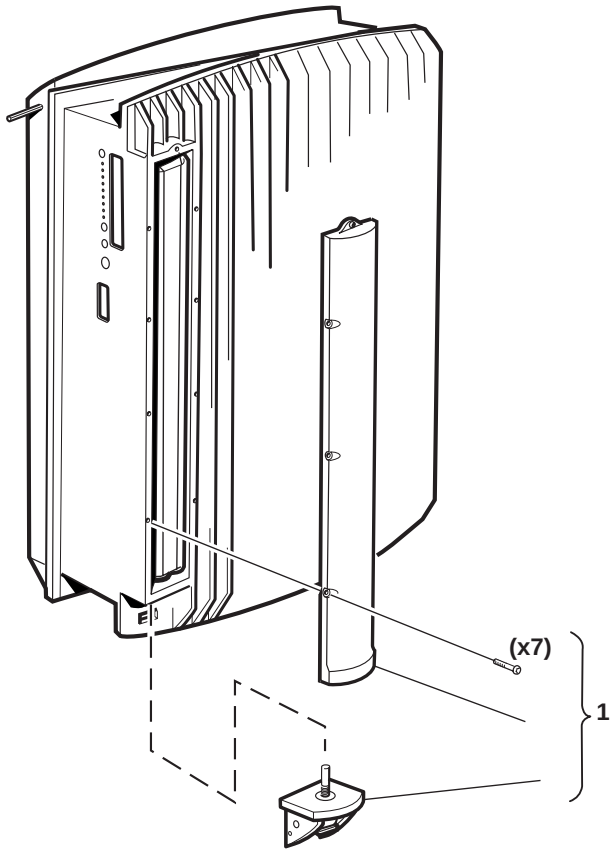

Figure 14

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5.1 Battery Accessories for RBS 2302

Pos.	Product No.	Product Name	Description
1	NTZ 112 86/BA01	Spare Parts Set	Internal battery cover set / *Includes covers and screws. For battery see Chapter "Not Repairable"*

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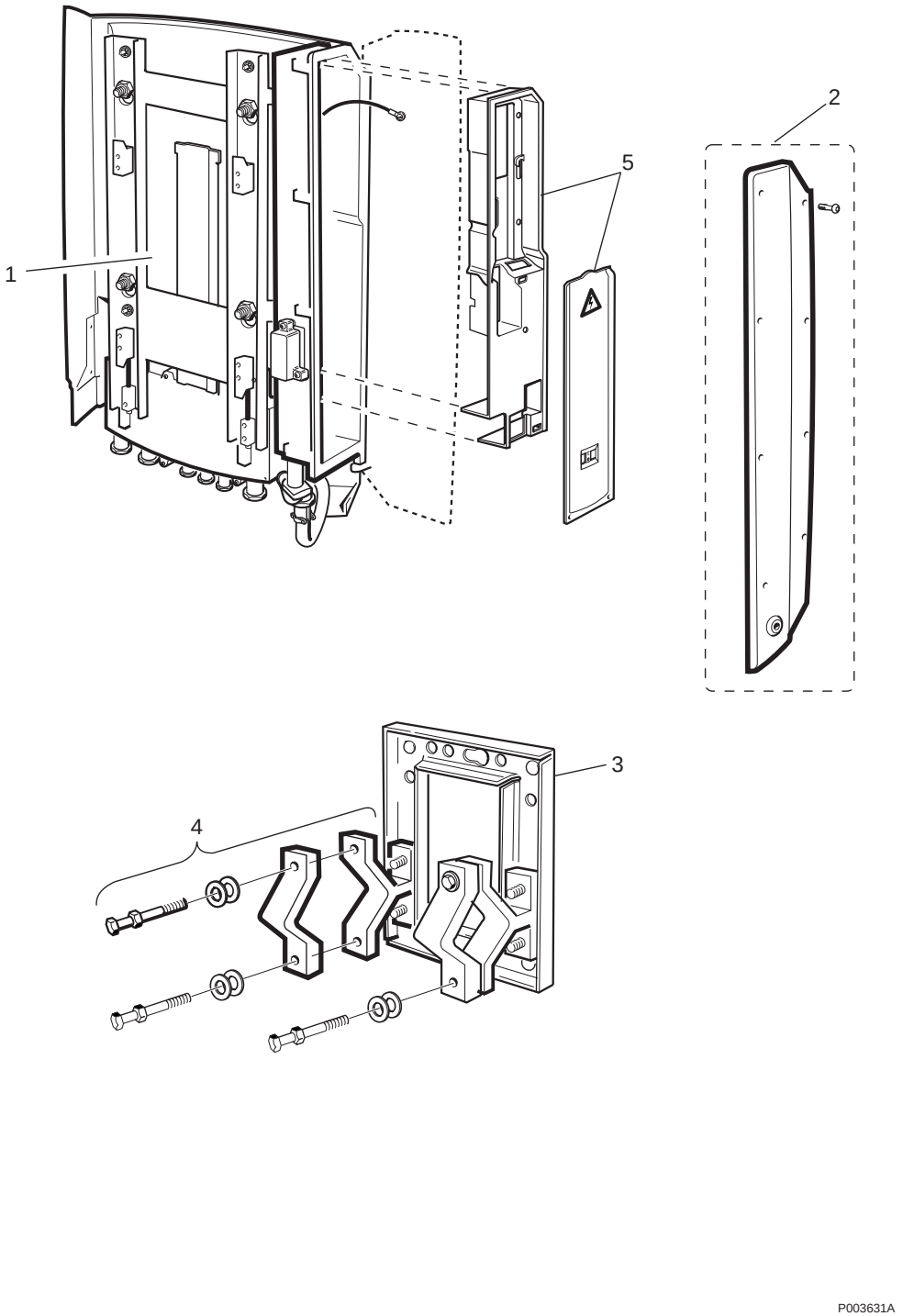

Figure 15

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5.2 Other Available Parts for RBS 2302, Mechanics

Pos.	Product No.	Product Name	Description
1	SEB 112 1017/2	Mounting Base	/*Excluding Side-door for installation box*
2	SDD 513 0100/1	Cover-lid	Side-door for installation box, complete
3	SEB 114 100/2	Mounting Plate	Wall Bracket
4	NTM 192 08/2	Set of materials	Pole / Mast Fixture set
5	NTZ 111 44/07	Spare Parts Set	Set for Installation Box /*Incl Protective covers and screws.*

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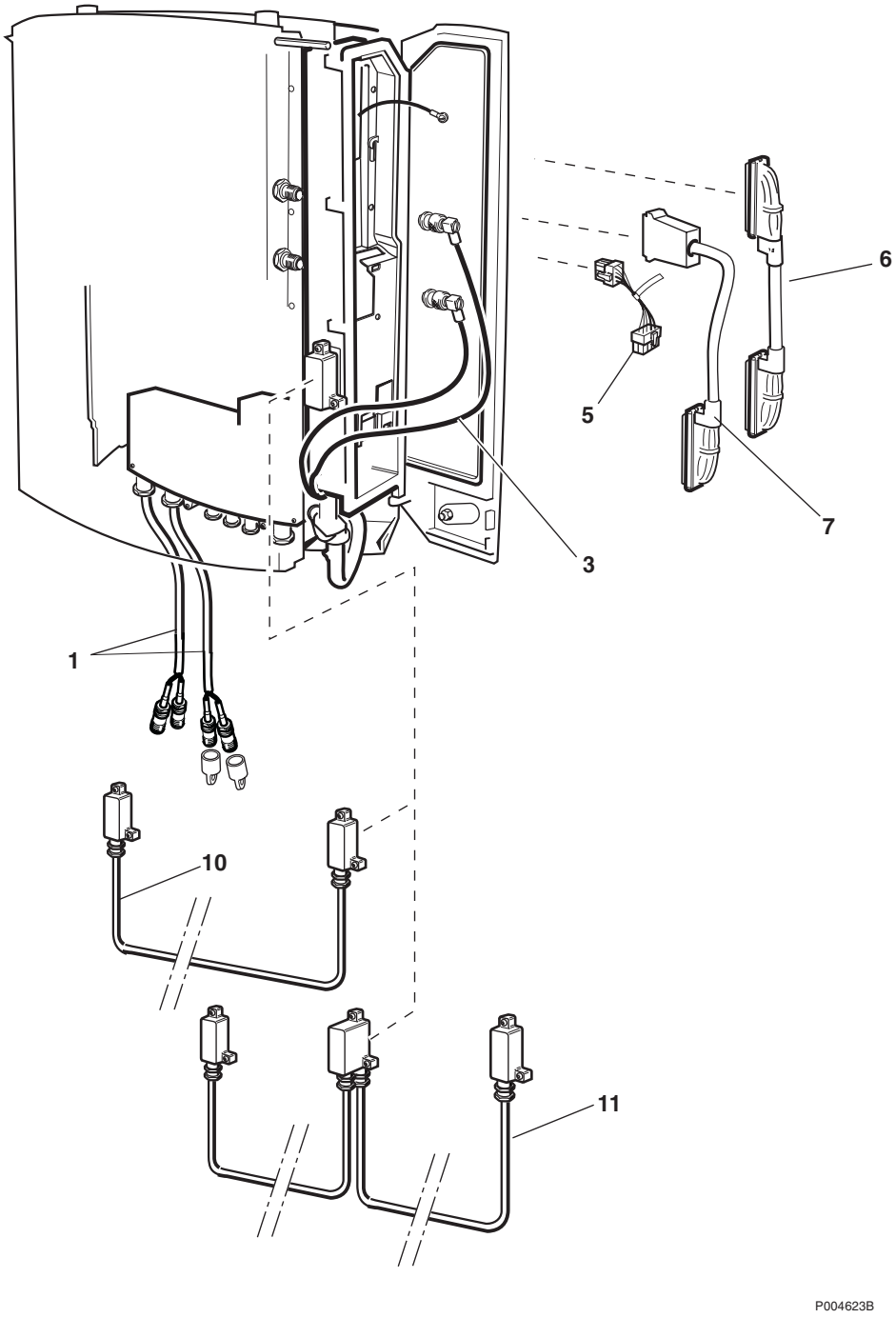

Figure 16

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5.3 Other Available Parts for RBS 2302, Cables

Pos.	Product No.	Product Name	Description
1	RPM 518 974/2	Cable with connector	Coaxial 75 ohm TNC/F.
3	RPM 119 87/1	Cable with connector	Jumper N-type/F /*Used in Cabinet*
5	RPM 518 903/00130	Cable with connector	Internal AC cable /*For installation box*
6	RPM 518 959/1	Cable with connector	Internal transmission cable 75 alt 100/120 ohm / *Reversable cable, for installation box*
7	RPM 518 958/1	Cable with connector	TXL-cable /*For installation box*
10	RPM 518 962/1	Cable with connector	4 TRX external cable /*(Optional)*
11	RPM 518 962/3	Cable with connector	6 TRX external cable /*(Optional)*

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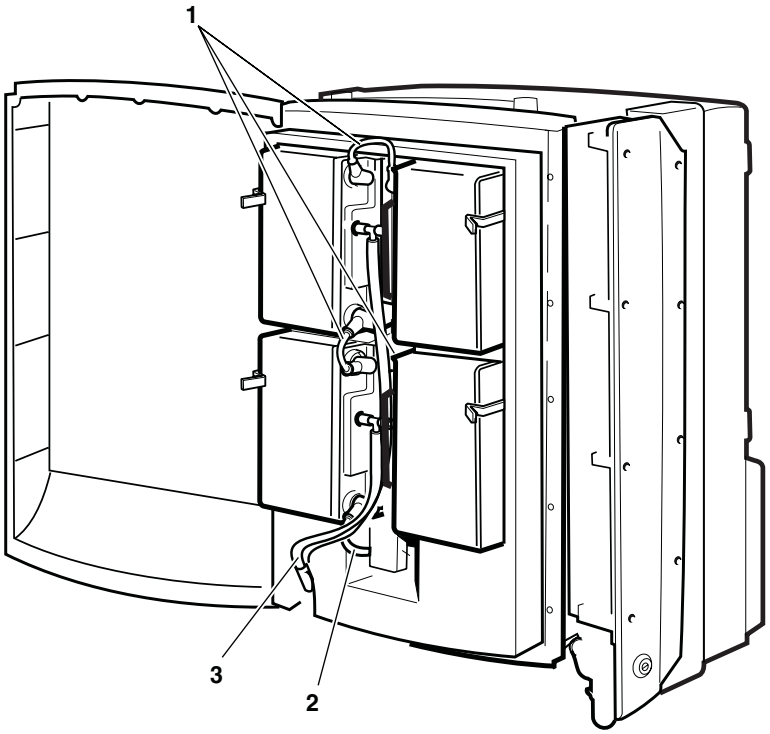

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Figure 17

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5.4 Battery Accessories for PBC

Pos.	Product No.	Product Name	Description
1	RPM 518 966/1	Cable with connector	For battery 0.06m
2	RPM 518 966/2	Cable with connector	For battery 0.11m
3	SEA 910 06/1	Hose	Ventilation set for PBC batteries

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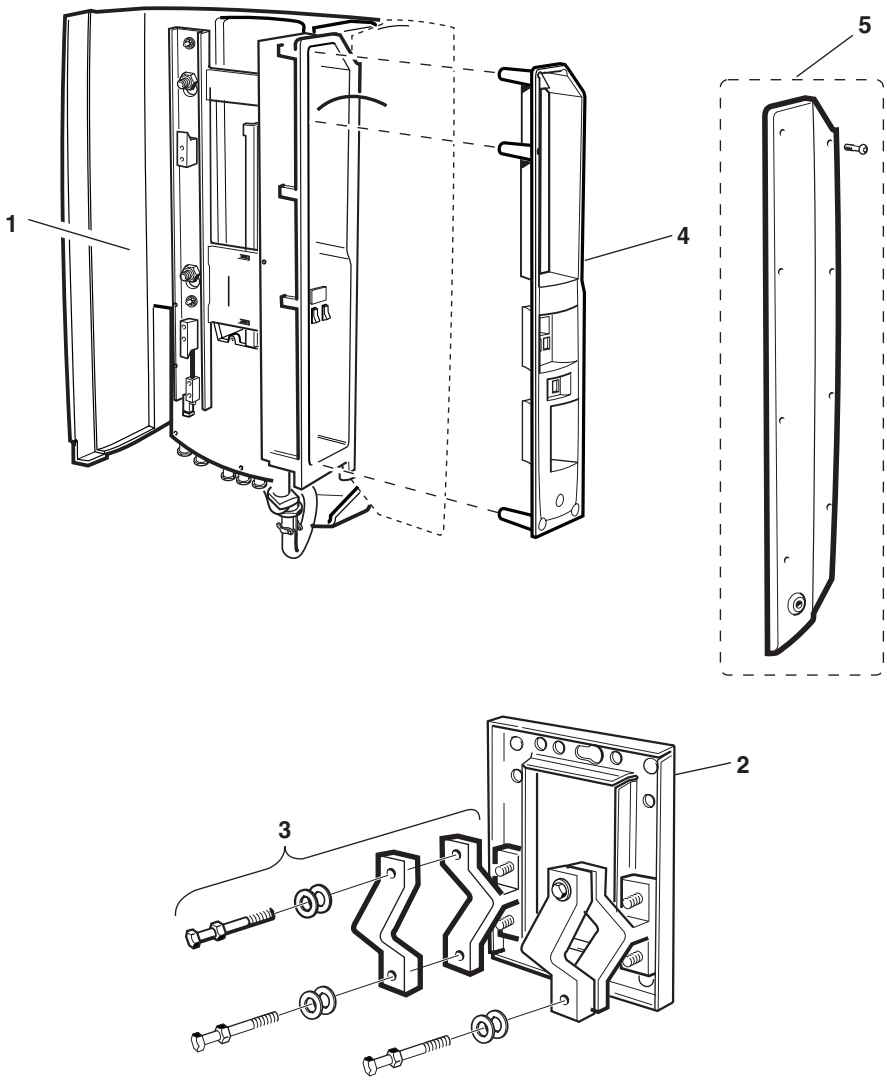

Figure 18

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5.5 Other Available Parts for PBC, Mechanics

Pos.	Product No.	Product Name	Description
1	SEB 104 19/2	Mounting Base	Complete Mounting Base for PBC
2	SEB 114 100/2	Mounting Plate	Wall Bracket
3	NTM 192 08/2	Set of materials	Pole / Mast Fixture set
4	SDF 105 21/2	Protective cover	/*Incl screws*
5	SDD 513 0120/1	Spare Parts set	Side-door for installation box.

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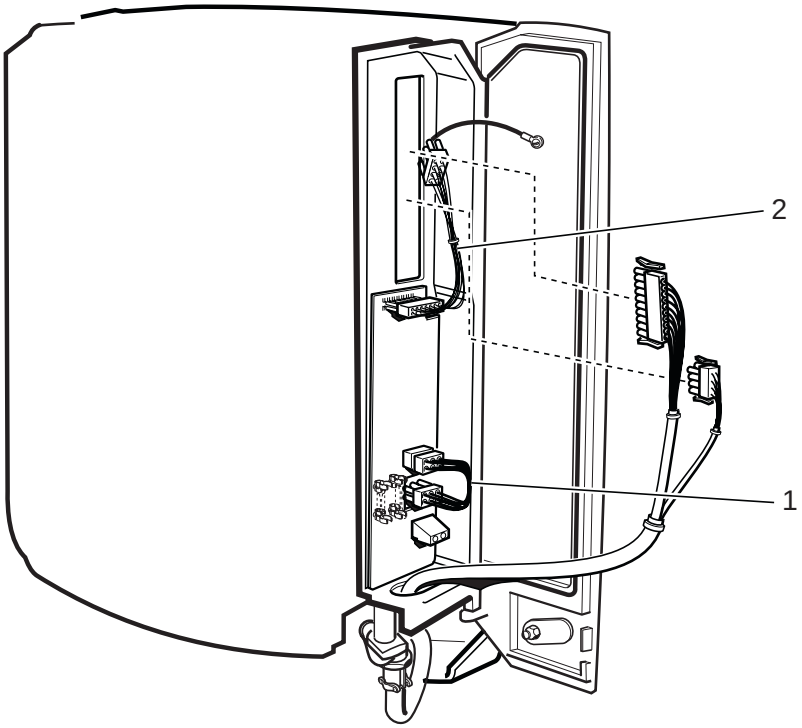

Figure 19

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5.6 Other Available Parts for PBC, Internal Cables

Pos.	Product No.	Product Name	Description
1	RPM 518 952/1	Cable with connector	Internal AC cable /*For installation box*
2	RPM 518 956/1	Cable with connector	Display cable /*For installation box*

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5.7 Packages for Repairable Products

Pos.	Product No.	Product Name	Description
(1)	RTK 994 04/1	Packaging Set	For RBS
(2)	RTK 994 04/7	Packaging Set	For PBC
(3)	RTK 993 4147/44	Box	For HDSL

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6 RBS 2302 Product Revision Information

This Chapter shows replaced or withdrawn Products.

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6.1 Replaced or Withdrawn Products

Old Product	Revision Information	New Product
6/BKC 861 0013/004	Replaced	24/BKC 861 0013/004
NTZ 111 45/07	Replaced	SDD 513 0120/1
RPM 513 760/1	Withdrawn	-
RPM 518 954/1	Withdrawn	-
RPM 518 974/1	Replaced	RPM 518 974/2
SEB 104 19/1	Replaced	SEB 104 19/2

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7 Numerical index for RBS 2302

Product No	Page
24/BKC 861 0013/004	33
BKV 301 321/1	25
BKB 191 2022/1	23
BMK 905 01/1	13
BMY 908 04/1	23
KRC 161 31/022	11
KRC 161 31/024	11
KRC 161 31/032	11
KRC 161 31/054	11
KRC 161 31/056	11
KRC 161 31/064	11
KRC 161 31/088	11
KRC 161 31/090	11
KRC 161 31/094	11
KRE 101 1556	19
KRE 101 1557	19
KRE 101 1558	19
KRE 101 1559	19
KRE 101 1560	19
KRE 101 1561	19
KRF 201 439/1	19
NTM 192 08/2	43, 49
NTZ 111 44/01	21
NTZ 111 44/02	25
NTZ 111 44/03	25
NTZ 111 44/04	25
NTZ 111 44/05	29
NTZ 111 44/06	29
NTZ 111 44/07	43
NTZ 111 44/08	29
NTZ 111 45/01	37
NTZ 111 45/02	31
NTZ 111 45/03	35
NTZ 111 45/04	35
NTZ 111 45/05	35
NTZ 111 45/06	37
NTZ 112 86/BA01	41

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NTZ 112 86/FU01	37
NTZ 112 86/FU02	29, 37
NTZ 112 86/SH03	21, 31
RPM 119 87/1	45
RPM 518 903/00130	45
RPM 518 952/1	51
RPM 518 956/1	51
RPM 518 958/1	45
RPM 518 959/1	45
RPM 518 962/1	45
RPM 518 962/3	45
RPM 518 966/1	47
RPM 518 966/2	47
RPM 518 974/2	45
RTK 993 4147/44	53
RTK 994 04/1	53
RTK 994 04/7	53
SEA 910 06/1	47
SEB 104 19/2	49
SEB 112 1017/2	43
SEB 114 100/2	43, 49
SDD 513 0100/1	43
SDD 513 0120/1	49
SDF 105 09/1	19
SDF 105 09/2	19
SDF 105 09/3	19
SDF 105 09/4	19
SDF 105 09/5	19
SDF 105 09/6	19
SDF 105 11/1	21, 31
SDF 105 12/1	21
SDF 105 12/2	31
SDF 105 13/1	21, 31
SDF 105 10/1	19
SDF 105 10/2	19
SDF 105 10/3	19
SDF 105 10/4	19
SDF 105 10/5	19
SDF 105 10/6	19
SDF 105 10/21	31
SDF 105 10/22	31

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SDF 105 10/23 31
SDF 105 10/24 31
SDF 105 10/25 31
SDF 105 10/26 31
SDF 105 21/2 49
ZAT 759 19/101 15

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